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CHINA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

PEOPLE'S REPUBLIC OF CHINA

LIFE SCIENCES

ABSTRACTS

CPPCC MEETING FOCUSES ON SCIENCE-ECONOMIC LINK

OW060836 Beijing XINHUA in English 0755 GMT 6 Apr 85

[Text] Beijing, 6 Apr (XINHUA)--Competitive bidding for key research projects
was proposed by a group of scientists here today as a way to link scientific
advances with economic development.

The proposal came in a joint statement made by Dr Wang Dezhao, one of China's
leading acousticians, and two other scientists at the current session of the
Chinese People's Political Consultative Conference.

They also recommended holding technical fairs to spread research findings and
apply them to economic construction. This could stimulate the development of
China's science and technology, Dr Wang said.

Overstaffing of research institutes was another problem discussed by CPPCC
members at today's plenary meeting.

He Huanfen, senior engineer at the Hubei Designing Institute of Industrial
Civil Engineering, and 17 others suggested transferring most of the non-
scientific staff from research institutes. This could be done by turning non-
professional services over to other institutions in society at large, they said.

They also proposed steps to integrate research with production in the form of a
new economic entity.

Lin Yu, an associate research fellow at the Institute of Semi-Conductors, held
that laboratories engaged in applied sciences in a research institute should
be separate and become independent institutions. "This would facilitate research
service for the national economy," he said. He called for smaller and more
specialized research institutes.

Geologist Hao Yichun stressed the role of higher education institutions in
scientific research. She urged closer ties between colleges and research and
production units to help the economy.

CSO: 4010/127

NATIONAL DEVELOPMENTS

CHINESE ACADEMY OF SCIENCES REPORTS ON RESEARCH

OW051923 Beijing XINHUA in English 1610 GMT 5 Apr 85

[Text] Beijing, 5 Apr (XINHUA)--The Chinese Academy of Sciences announced here today that its researchers have completed more than 1,274 projects, more than 50 percent of which have been applied in production. Among them, the induced soybean variety named "Youbian Dadou No 30" has a strong adaptability and resistance to disease. Last year, the variety was planted on 100,000 hectares in Anhui, Henan, Sichuan, Jiangsu, and Hebei provinces, and near Beijing. The total output was 150,000 tons, 30,000 tons more than conventional varieties grown in the same fields.

A new process for making applied aluminum-rare-earth alloys was applied in six aluminum plants in Jilin, Gansu and Guangdong provinces. The Liancheng Aluminum Plant in Lanzhou, Gansu Province, made an extra profit of 3 million yuan in 1984 after applying this process.

The Chinese Academy of Sciences has 11 subsidiaries all over China. Now the academy is trying to have the rest of the research results applied in industrial and agricultural production by means of technical transfers, running joint ventures and providing technical consultancy services.

Academy officials expect to see more research successes in the future, as the research system is undergoing structural reforms.

According to the reform plan, stronger ties between research and production will be established through the contract and responsibility systems, whereby most research projects will be commercialized and state grants to research institutions will be greatly reduced. This will provide further incentives to researchers and raise efficiency, the officials said.

CSO: 4010/127

TECHNICIANS URGED TO WORK IN RURAL FACTORIES

OW260840 Beijing XINHUA in English 0830 GMT 26 Apr 85

[Text] Hangzhou, 26 Apr (XINHUA)--Technicians in Zhejiang Province, East China, are being encouraged to go to work in rural factories.

Six local authorities circulated a document recently, urging various sectors to help the flow of technicians from city to countryside, and from units where their professional knowledge is not in great demand to places where it is badly needed. The document says that the redirection of expertise is an important reform in the personnel system which will help promote the progress of science and technology.

An official in Hangzhou, capital of the province, said this campaign will bring people's talents into full play and improve economic efficiency. Last year, more than 1,000 technicians in the city changed their work units; 1,200 from other parts of the country were employed locally, mostly by rural factories.

Assistant engineer Qi Weidong has helped his new work unit--The Hangzhou Universal Coupling Plant--expand its heat treatment workshop since May last year. Graduating from Shanghai's Jiaotong University in 1968, Qi went to work in a state-owned nozzle and pump plant, but decided to make a move as it already had two engineers in the heat treatment section.

Engineer Yu Peijiang helped the bicycle plant in Xiaoshan County quadruple its work efficiency by updating equipment and improving management after he joined the plant in August last year from Heilongjiang Province. He is now the director.

The province allows technicians in colleges, research institutes and urban enterprises to work for rural factories in their spare time. Remunerations belong in the main to individuals, the document says.

Retired technicians and skilled workers receive the same bonuses and welfare benefits as the ordinary employees of the rural factories they work for.

Rural industry in Zhejiang produced 15 billion yuan-worth of products last year, accounting for 60 percent of the total rural output value.

CSO: 4010/133

HENAN SETS UP LEADERSHIP SCIENCE RESEARCH SOCIETY

HK020510 Zhengzhou Henan Provincial Service in Mandarin 2300 GMT 31 Mar 85

[Text] The founding meeting of the Henan Provincial Leadership Science
Research Society was held in Zhengzhou yesterday morning.

At the meeting, He Zhukang, Provincial CPC Committee Secretary and governor,
and Zhao Di, Provincial CPC Committee deputy secretary, were elected honorary
presidents of the society; and Provincial Vice Governor Hu Jiyun was elected
president of the society.

Provincial party, government, and army leading comrades Zhao Di, Zhang Shude,
Hu Jiyun and Tao Zhizhong attended the meeting and delivered speeches.

On the importance of the establishment of the society, Comrade Zhao Di pointed
out that leadership science is important knowledge and a basic and compulsory
subject which the leading cadres at all levels must master in order to properly
exercise their leadership. Under the new situation and confronted with new
tasks, leaders are required not only to understand the characteristics of modern
mass production and basic scientific and technological knowledge, but also to
grasp Marxist leadership science and the general laws of leadership work so as
to effectively exercise their leadership.

Comrade Zhao De demanded that veteran comrades who have for a long time held
leading posts and gained abundant experiences in leadership work, middle-aged
and young comrades with explorative minds who have recently taken up leading
posts, and professional theoretical workers engaged in leadership science,
under the specific arrangements by the research society, unite and cooperate,
promote and help each other, and make contributions to establishing the system
of socialist leadership science which has Chinese characteristics and meets the
needs of modernization.

CSO: 4008/308

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NATIONAL DEVELOPMENTS

BRIEFS

GROUP TO COORDINATE TECHNOLOGICAL TRADE--Beijing, 20 Apr (XINHUA)--China will set up a special group promoting and coordinating nationwide sales and purchase of technological items, now considered as commodities under the new modernization policies. The group will be composed of representatives of ministries, state commissions and bureaus related to science, technology, finance, patent, education and statistical work as well as the Chinese industrial and commercial bank. The group, already approved by the State Council, will be headed by a representative of the State Science and Technology Commission. It will provide macro-guidance to the nation's technological market, and be responsible for formulating regulations and decrees concerning such market. A national technological trade fair will open next month in Beijing, according to a State Council circular reaching XINHUA today. [Text] [Beijing XINHUA in English 1449 GMT 20 Apr 85]

HUNAN SCIENCE, TECHNOLOGY CONFERENCE--The Hunan provincial conference on exchange of scientific and technological talented people and information lasted 11 days and concluded yesterday. Business at this exchange conference was brisk. Some 400 items of achievement were transferred, some 1,890 talented people were exchanged, and some 150 people applied to solve difficult problems in reply to advertisements. There were approximately 300 items of technological services, loans of some 80 million yuan were issued, some 3,000 pieces of information were provided, and approximately 100 items of new technology were popularized. At the exchange conference, a large number of scientific research units found specific objects of service and a large number of enterprises found specific objects of reliance for applying science and technology to invigorate enterprises. On the afternoon of the day before yesterday, the exchange conference held a meeting of the responsible persons of all prefectural and city delegations. (Wang Likang), vice chairman of the provincial science and technology committee, summed up the situation at this exchange conference. Jiao Linyi and Wang Daoqi, leading comrades of the provincial CPC committee, spoke at the conference, stressing: In future, we must normalize the technological market and must further do well in implementing the policies toward intellectuals. We must create an excellent atmosphere of respecting knowledge and talented people. [Excerpts] [Changsha Hunan Provincial Service in Mandarin 0000 GMT 1 Apr 85]

CSO: 4008/308

APPLIED SCIENCES

NEW HIGH-FLUX REACTOR MARKS BIG STEP FOR NATION'S NUCLEAR TECHNOLOGY

Beijing RENMIN RIBAO in Chinese 10 Apr 85 p 5

[Photograph and caption]
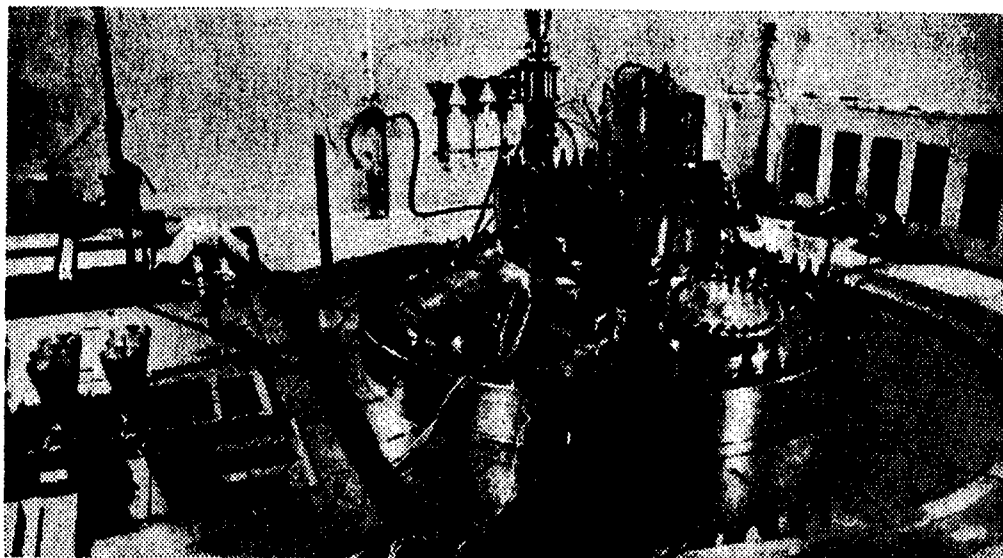
[Text] The Southwest Nuclear Reactor Engineering Research and Design Institute
of the Ministry of Nuclear Industry has developed China's first high-flux nuclear
reactor--after 3 years, all experimental and production tasks have been com-
pleted. The large-capacity reactor has more irradiation space and good loading
adaptability and represents world-class technology, greatly boosting the
development and application of nuclear technology in China.

CSO: 4008/305

APPLIED SCIENCES

ANTARCTIC STATION'S PRECISE LOCATION VERIFIED

OW100155 Beijing Domestic Service in Mandarin 2230 GMT 8 Feb 85

[Text] The precise location of the Chang Cheng Station, China's first Antarctic scientific survey station, has been verified. The astronomical coordinates of the station are: latitude 62 degrees, 12 minutes, (?59.32) seconds south; and longitude 58 degrees, 57 minutes, 51.87 seconds west. This location was verified by the maridian satellite using the method of single-point positioning on the basis of the orbital parameters of the broadcasting satellite. So far it has received more than 90 effective satellite passages, showing that the verified location is precise and reliable.

After the station's location was verified through observations by precision satellites, and the gauging of the tide was completed, China initially set up the coordinates and elevation system for making observations on George Island in Antarctica. An artificial tide station and a bench mark have also been established on the coast to the east of the survey station. The results of survey show that the average height of the area of the Chang Cheng Station is about 10 meters above sea level.

On the morning of 7 February, a 1.5-ton large iron anchor of G-121, a ship of the People's Navy, was placed to the left of the flag post of the Chinese Antarctic Chang Cheng Station. A solemn ceremony was held under the bright-colored five-starred red flag to put the anchor in place.

In his speech, (Zhao Guocheng), deputy chief commander of the fleet to Antarctica, said that this large anchor shows that the PLA Navy may reach the South Pole and is completely capable of doing so. It also symbolizes the hard work and contributions of the officers and men of the Navy who have joined members of the expedition team in establishing the Chang Cheng Station amid raging winds and snow.

On the evening of 6 February, the party branch of the Chinese Antarctic Survey Station held a general assembly of party members. Three expedition members were recruited into the party. They were the first members recruited by the Antarctic Chang Cheng Survey station. They were Wang Weihua, technician of the China

new-type building materials company, Bian Lingen, assistant engineer of the Academy of Meteorological Science under the State Meteorological Bureau, and Chen Qiuchang, engineer of the China Electric Wave Transmission Research Institute.

In the course of construction of the Chang Cheng Station, these three comrades displayed the indomitable spirit of fighting in defiance of hardships, and accomplished the tasks assigned by the party organization in an outstanding way.

CSO: 4008/307

APPLIED SCIENCES

ANTARCTIC SURVEY TEAM RETURNS TO SHANGHAI

OW070110 Beijing XINHUA Domestic Service in Chinese 1837 GMT 5 Apr 85

[By reporter Zhang Jimin]

[Text] Shanghai, 5 Apr (XINHUA)--The "Xiangyanghong 10" scientific survey ship and the Navy's No 121 salvage ship came back after conducting surveys in Antarctica and arrived safely today at the Yawosha anchorage in Shanghai. Responsible comrades of the State Oceanography Bureau and the naval leading organ went on board to call on and greet the kinsfolk who had come back from afar, bringing with them a dozen kinds of fresh vegetables.

The Antarctic survey fleet arrived at the anchorage at the estuary of the Chang Jiang in Shanghai at 0135 today and then came to the Yawosha anchorage around 1200. After being far away from the motherland for more than 4 months, traveling some 23,000 nautical miles, and successfully fulfilling their mission of setting up the Great Wall observation station in Antarctica and conducting surveys in the southern ocean, the survey team members and naval officers and men now returned to the embrace of the motherland. Everyone was in high spirits and radiant with smiles. Zhao Guochen, deputy general commander of the Antarctic survey fleet, said that they had successfully fulfilled the mission with the support and solicitude of the people of the motherland. With great interest, many naval fighters related the Antarctic scene showed the leading comrades who came aboard to visit them to rocks and mosses they brought back.

CSO: 4008/307

APPLIED SCIENCES

HIGH-SPEED SIGNAL PROCESSOR DEVELOPED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 7

/Article: "High-speed Signal Processor Using an Am2900 Bit Slice Device
Developed"/

/Text/ The Institute of Acoustics of the Chinese Academy of Sciences has
developed the FFT signal processor--a special use computer used for high-speed
realtime signal processing. The conception of this computer is brand new.
It uses an Am2901 bit slice device, VLSI multiplier TDC 1010, and RAM2147H
high-speed components with FFT algorithms, automatic calbiration, and micro-
program control. Word length is 16-bits, the power spectrum time for 1024
real number points is 5ms, the highest sampling frequency of realtime processing
is 200 KHz. Its processing speed achieves advanced international levels.

With this computer as the core, the attached A/D converter (sampling frequency
of 200 KC, 10 place) and microcomputer can carry out pre- and post processing,
forming an analyzer. Existing functions are FFT, IFFT, automatic reciprocal
power spectrum and automatic reciprocal switching.

This computer can improve FFT operating speed for computer peripherals and can
be a signal processing element of a composite type program signal processor.
It can be used in sonar, radar, image processing, seismic signal processing
and communications.

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CSO: 4008/264

NEW R&D TREND IN CHINESE LANGUAGE INFORMATION PROCESSING

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 7

/Article: "New Trend in Chinese Language Information Processing Work, Research and Dbvelopment Emphasis Shifts to Plug-compatible-type Terminals"/

/Text/ The "Plug-compatible-type Chinese Character Terminal" and the "Plug-compatible-type Chinese Character Processing System" developed by the Institute of Modernized Educational Technology of Beijing Normal University, recently passed appraisal in Beijing. This achievement received favorable comments from the representatives at the evaluation meeting.

The development of China's Chinese language information processing systems has gone through three stages: 1) Simple Chinese written language processing systems with Chinese character management functions; 2) "Chinese character high level language" Chinese language computer systems compatible with Western languages; 3) Chinese language information processing systems with Chinese character support for high level language carried out by revising the original computer control system. The task of getting a Chinese language computer system has reached the stage where it can be used in a preliminary way. However, taking into account such factors as the fact that the operating systems of machines above the medium and large-scale level are hard to change, new editions of operating systems from abroad keep coming out, and in addition, Chinese character processing function is concentrated in using a main computer which greatly increases the expenses of operation, searching for a newer and faster way to resolve the problem of Chinese character processing has become an important issue facing Chinese language information processing researchers now.

The Beijing Normal University system was developed by realizing high-level language and even data base Chinese character support without any fundamental modification of the operating system, and without any modification of the high-level language compiler or interpreter programs. The Chinese character terminal is a modified 3102 character display terminal. The main task was to make the Chinese character processing functions modular, to revise and expand comprehensively the original CRT control program and consolidate it with the Chinese character function modules. This increased the Chinese character functions and also preserved all the original functions of the terminal. The character generator was designed on the basis of the idea of "virutal

memory" and is another design achievement. It can utilize the Chinese character storage code to address the dot matrix information directly. About 8,000 Chinese characters can be addressed directly. Since the Chinese character generator is a plug-in board it does not take up any of the terminal's memory, which is very convenient for the user. The Chinese character and control functions board and the Chinese character library and the Chinese character generator are all reduced to one 200 mm square circuit board, which is very easy to plug in.

This Chinese character terminal in principle has functions which are compatible with many computers, it has been connected to such computers as the PDP11/23, CROMEMCO II, and AIM-16, with good results and the Chinese character functions were good. The developers also successfully used a Chinese language relational data base with dBASE II.

Specialists participating in the evaluation gave these results high evaluations and felt that it was China's first plug-compatible type Chinese character terminal and that it would have a great influence on future Chinese character processing research and development work.

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CSO: 4008/264

CENTER FOR HIGH TEMPERATURE PLASMA PHYSICS CERTIFIED

Hefei ANHUI RIBAO in Chinese 21 Jan 85 p 1

[Article by Hu Maolian [5170 2021 1670] and Chen Yin [7115 5391]]

[Text] The first piece of good news in science and technology of 1985
was announced by the Chinese Academy of Sciences [CAS]: the construction
of a research center for high temperature plasma physics and controlled
thermonuclear fusion was completed on Dongpu Island west of Hefei City,
and was certified and accepted by the State on 20 January of this year.

Construction of this research center was listed as one of China's key
scientific research projects. Since initiation of the project in 1978,
a number of design and construction units, and manufacturing plants worked
intensely for 6 years; by the end of last year, the project was essentially
completed. The CAS research center is considered to be a medium-sized
facility compared to other facilities of this type around the world. Its
experimental capabilities are equivalent to those of similar research
centers in several European countries. It has over 43,000 square meters of
laboratory and auxiliary space, including five large halls and more than
30 small laboratories. It has four of China's largest d.c. pulse generators
capable of producing 80 megawatts of power, an induction coil capable of
storing 200 million joules of electric energy, and a capacitor bank that
can store 8 million joules of energy. It also has equipment for producing
deionized water, low temperature equipment, a cooling system using refriger-
ated circulating water, and a heat supply system. Not only is this center
one of China's important bases for thermonuclear fusion research, it is
also likely to become a scientific research facility with extreme physical
conditions that the CAS will make available to the general public.

At the request of the national planning commission, the CAS sponsored a
certification and acceptance meeting for the center from 15-20 January.
The governor of Anhui Province, Wang Yuzhao, deputy director of the CAS,
Zhou Guangzhao, and assistant secretary of the CAS, Yueh Zhizhong all
attended the meeting. Representing the Provincial committee and the
provincial government of Anhui, Governor Wang first extended his personal
greetings to all the officials, specialists, and scholars who attended
the certification and acceptance meeting, and to all the engineering and
technical personnel who participated in the design, construction and

installation work of the project. He pointed out that completion of this research center and the successful discharge and operation of the HT-6M Tokamak facility, which was designed and built by the Plasma Research Institute, would have a stimulating effect on Hefei's scientific education program, on Anhui's economic and technological development; it would also promote China's scientific development and the application of accomplishments of scientific research to industrial and agricultural production, thus generating ever increasing economic benefits.

3012
CSO: 4008/271

CONTROLLED THERMONUCLEAR FUSION, HIGH TEMPERATURE PLASMA PHYSICS

Hefei ANHUI RIBAO in Chinese 21 Jan 85 p 1

[Article by Science and Technology Department, Plasma Institute]

[Text] Controlled thermonuclear fusion research is a frontier scientific field which has far-reaching effects on mankind's struggle in trying to understand and change Nature.

At the present time, the primary source of nuclear energy comes from the fission process of heavy nuclei. This form of nuclear energy is limited because of the limited uranium supply; it also has the problem of treating radioactive waste materials. Nuclear fusion is a process where two hydrogen nuclei are fused together under extremely high temperature conditions to form a heavier nucleus, and at the same time release huge amount of energy. On the surface of the sun, thermonuclear processes are taking place continuously; the energy thus produced has been the basic source of all energy sources used by mankind.

The explosion of a hydrogen bomb also involves thermonuclear fusion reaction, but its reaction speed cannot be controlled. In order to utilize the energy released by a thermonuclear fusion process, we must study methods of controlling the fusion reaction; this technology is called controlled thermonuclear fusion. The fuel used in a thermonuclear fusion process are isotopes of hydrogen: deuterium and tritium. They can be extracted from the almost unlimited seawater; the amount of deuterium extracted from a liter of seawater when used in a thermonuclear fusion process can produce an amount of energy equivalent to the energy released by burning 300 liters of gasoline. Nuclear fusion also produces very little radioactive waste. Therefore, thermonuclear fusion is a very promising energy source with an almost unlimited supply; it is also economical, safe, and relatively "clean."

However, in order to produce a nuclear fusion reaction, the positively charged deuterons must overcome the statis repulsion force before they can be fused; this requires an extremely high temperature (above 50 million degrees). Under such conditions, the fuel is fully ionized into a plasma which contains positively charged ions and negatively charged electrons. A plasma is a fourth state of matter in addition to the gas, liquid and solid states. For many years, the central issue of controlled thermonuclear

fusion research has been to find a way to raise the temperature of plasma to an extremely high level and to maintain this temperature for a sufficiently long period to allow fusion reactions to take place. In order to reach this goal, one must study the physical laws of high temperature plasma; as a consequence, the science of high temperature plasma physics has been developed.

Currently, most developed countries place a very high priority on the research of controlled thermonuclear fusion. Some countries have allocated huge funds to construct large-scale laboratory facilities to explore or to verify the physical feasibility of controlled thermonuclear fusion. The completion of the Chinese Academy Sciences Research Center for High Temperature Plasma Physics and Controlled Thermonuclear Fusion will provide a good environment for China's research and development work in this field.

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CSO: 4008/271

APPLIED SCIENCES

CHINA'S FIRST DISTRIBUTED OFFICE INFORMATION SYSTEM

[Article by Correspondent Chen Tianzhai [7115 1131 3564]]

[Text] China's first distributed office information system has been developed by the Huazhong (Central China) University of Science and Technology. If a plant has such a system installed, all departments and machine shops may be linked into an organic whole. At any time, microcomputers can convert the production, consumption, sales, and capital computations, disposition of personnel, and other conditions with respect to laboratories and machine shops into various types of report forms and data and transmit them to the plant director. The plant director can then, on the basis of these reports and data and with the aid of the computer, make appropriate decisions and transmit instructions to laboratories and machine shops in order to keep plant management and production at their best at all times.

The concept of office automation has been developed since the late 1970s. In recent years a large volume of research has been carried out in both China and abroad and [it] is becoming a new branch of learning. The bulk of office automation systems developed abroad, however, remain in the experimental stage. The Office Automation Research Team of the Huazhong University of Science and Technology commenced development work in the Fall of 1982 on the basis of current conditions and requirements in China. In the research and development process, they probed boldly and researched meticulously, finally developing a distributed office information system with special characteristics. This system comprises a local network of multiple microcomputers (including network software), office information management systems, list and form processing systems, electronic mail systems, automated decision-making systems, and other components; and is adapted to the requirements of the various types of office operations. When in operation, microcomputers can replace or assist workers to manage files, finances, planning, developing charts, dispatching, processing mail and documents, and so on.

This achievement was evaluated and approved on 30 April. The specialists, professors, and technical personnel from areas throughout China unanimously considered that the overall design of the system was correct and rational, its [repertoire of] features was relatively complete, its operation was stable and reliable, operation and maintenance were convenient, the price was comparatively low, and it is in a leading technological position in China as well as abroad.

APPLIED SCIENCES

FIRST TIME USE OF COMPUTER FOR BIOLOGICAL MULTIFACTOR CLASSIFICATION

Wuhan HUBEI RIBAO in Chinese 30 May 84 p 1

[Article by Correspondent Chen Tianzhao [7115 1131 3564]]

Professor Xu Huibi [1776 6540 4310] along with 11 instructors and researchers of Huazhong (Central China) University of Science and Technology succeeded for the first time in China or abroad to use a computer for multifactor classification in the area of trace elements. As a result, they propelled China into a new research phase in biological trace elements.

Research in the area of biological trace elements is a new discipline. Its principal research objective is to study the relationship between trace elements and diseases as well as health. At present, research in China and abroad in the area of trace elements (that is the content of the various types of trace elements) uses corelation analysis for the most part. It can indicate the relationship between each type of trace element and a certain disease. This method essentially considers only the action of a single trace element and fails to consider problems stemming from the combination of the actions of several related trace elements, making it difficult to draw fixed quantitative conclusions with regularity. Therefore, to find a new research method to facilitate classification of the various types of trace elements according to their strong and weak interactions within organisms, and to find their patterns, is a key topic for worldwide development of this discipline.

In 1982, 11 instructors and researchers of the Chemistry Department, Mathematics Department, and Image-Recognition Research Laboratory of the Huazhong (Central China) University of Science and Technology, including Professor Xu Huibi of the Image-Recognition Research Laboratory, commenced research in the problem of interaction of biological trace elements. They recognized that more than ten types of trace elements exist in a single organism. Among them there are mutually offsetting reactions as well as mutually intensifying reactions. Many types of human diseases, such as cardiovascular diseases, cancer, various endemic diseases, and so on, are actually the composite manifestations of interactions among the many trace elements within the human body. To explore patterns of the influence of such interactions on the health of the human body, their research resulted in the development of computerized multifactor classification, which successfully classified the area of trace elements solving a key problem in research in the area of trace elements.

The establishment of computerized multifactor classification opened a new avenue in the broad application of the area of trace elements. During the past year, they and certain units have conducted research in 15 projects of different types, achieving relatively good results in all, proving that this method may be used not only in the diagnosis of diseases but also in the analysis of environmental quality, assessing the nutritional value of foods, etc.

Although computerized multifactor classification had been put forth relatively recently, it has already received high evaluations in China and abroad. At the evaluation conference called on May 5, the specialists recognized that this method had furnished an advanced research method for areas related to trace elements, such as medicine, biology, chemistry, environmental science, etc. This method has reached the advanced level internationally. The publication last June of an article on the preliminary results of this research in the English Edition of FENZI KEXUE [Molecular Science] attracted the attention of colleagues abroad, and letters have been received from scholars in the United States, the Soviet Union, the Federal Republic of Germany, France, Italy, and other countries requesting articles and materials.

APPLIED SCIENCES

MICROCOMPUTER APPLICATIONS SUMMARIZED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 8

/Article: "Microcomputer Applications (58)"/

/Text/ The Department of Automation at Qinghua University and the Beijing Cotton Mill No 2 cooperated to use a TP801 single-board computer for circuit inspection of 9 semi-automatic winding machines in a spinning shop. The winding machines themselves have various sensors which can supply over 50 signals required for automatic inspection. These signals are collected through interface circuits, the inspection signal count is 75 x 9, and the circuit checking time is 0.5 seconds. The system can process the data collected and can also automatically print out up to 13 types of reports every 8 hours on order so that management can carry out quality analysis on the basis of the information provided in the reports.

Hebei Province's Baoding Wireless Plant No 14 and Second Heavy Machinery Plant jointly developed a computer control system for model WJK-1 hot die forge pressure. This system uses a multi-board 8080A microcomputer. The system can control such functions as press impulse adjustment, closing height adjustment, braking time calculation, and ding /7307/ material. In addition, the system can monitor the tonnage and shaft temperature to ensure the safe operation of the press.

In ecology experiments, the ambient temperature and ventilation humidity have a close relationship with the ecological processes of the organisms. To monitor changes in these parameters, Zhongshan University used a SYM-1 single-board computer to manufacture an ecology experiment monitoring system. This system not only can automatically collect data, but it also has such functions as real-time control, number filtering, automatic correction of errors, and carrying out accurate numerical operations. This system has a definite general purpose nature.

The Ministry of Machine-Building Industry's Guilin Institute of Electrical Appliances used a combination of hardware and software to apply a Z80 single-board computer to a powder size image analyzer

which greatly improved its functions. When carrying out image processing, it is not necessary to store an entire image before processing, but only to scan and process dot by dot, thus saving a great deal of memory. Each time this instrument can measure 4 one-time parameters and after processing can output such parameters as total field of view, multiple field of view particle total, total particle area as a percentage of total field of view area, average particle diameter, and ratio of circumference and diameter.

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CSO: 4008/302

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EXPERIENCE WITH USING DJS-135B(C) SUMMARIZED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 9

/Article by Shi Shuiying /4258 3055 5391/, Shanghai Wired Communications Plant/

/Text/ One of our plant's projects demands that a computer be able to work reliably in an adverse environment of vibration and climate, and in particular be able to adapt to temperature changes over a very broad range. At the same time, it also demands that the computer have powerful command functions, small size, flexible operation, and ease of maintenance. We bought a DJS-135C computer from the Yunnan Electronics Equipment Plant. It has operated very well and satisfied the above demands. We have come to know the following feautres of this computer:

1. In the three areas of resistance to vibration, heat dissipation, and ruggedness it has been greatly improved, system reliability especially is high in a broad range of temperature changes (-15 C - +45 C).

2. In comparison with other 100-series computers, its command functions have been expanded and strengthened, especially in multiplication and division and the addition of a group of stack commands, and satisfied the needs of the engineering project for real-time work, sub-program multilayered nesting and multiple interrupts.

3. The main computer uses medium and large scale components and dynamic MOS memory to replace the magnetic memory, microprogram technology was used in design which not only lowered power consumption and miniaturized the size, but also greatly improved reliability and stability. At present the average trouble free period exceeds 1,000 hours and this played a very important role in improving the overall reliability of the project.

4. Something in the DJS-135B(C) computer system which is most welcomed by applications software designers is the development system which is fixed in the EPROM board, i.e., a project of the SMOS software

system. It has four utility programs: screen editor enhanced assembler, error routine, and reverse assembler. With the help of the screen editor, a program can be edited and revised on the CRT, much superior to the three-function sanyong /0008 3938/ teletype input, and this eliminates the annoying noise. The assembler not only can assemble the paper tape source programs but can also directly assemble programs in memory, thus avoiding the bother of repeatedly sending from the photoelectrical device to the source tape. There are many kinds of commands in the error routine and it is easy to use. The number of breakpoints and channel program can be installed at the same time. This is very fast and effective for debugging and discovering recurring errors in the program. At the same time these utility programs can be mutually transferred so that software designers can rapidly and correctly develop new applications software.

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CSO: 4008/302

APPLIED SCIENCES

CHINESE NEWSPAPER SINGLE-PAGE FORMATTING SOFTWARE SYSTEM PASSES EVALUATION

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, Jan 84 p 8

/Text/ With the vigorous help of the Editorial Department of the Shanghai JIEFANG RIBAO, the Shanghai Institute of Computing Technology and the Shanghai Institute of Printing Technology developed the "Chinese Newspaper Single-page Formatting Software System." With the report of the Shanghai Publishing Bureau, it passed evaluation on 26 November 1983.

This software system was developed on the basis of an imported fourth generation laser phototypesetting system. Using its editing terminal's Z-80 microprocessor as a single-page Chinese newspaper formatter, this system can now automatically typeset such common formats as relief, anastatic script hui /0932/, front and back pages toujiaoti /7333 5183 7344/, and galley unrestrained /?/ ziyouban /5261 3945 3652/. It can also convert horizontal composition to corresponding vertical composition. The layout and conversion of each format is unusually fast and flexible. Converting one format into another or converting horizontal composition to vertical composition takes only 2-3 minutes. During processing, in line with the demands of the printing trade, the software system can also automatically inhibit punctuation at the beginning or end of a line and automatically inhibit splitting a character or number string, thus resolving a problem in newspaper format conversion.

The software system can also use the printer to print out proof samples and galley proofs which can reflect the overall typesetting situation so that the photographic paper proofs of the original system are converted to ordinary paper proofs thus greatly lowering costs.

The Shanghai Publishing Bureau invited specialists in editing and in computer system and printing system research in the newspaper world to carefully examine and evaluate the system. The specialists felt that the newspaper format types processed by this system were very complete. The standardized formats conform rather well to the

regular wording of newpaper editing, format conversion is flexible, and can suit the variability of newspaper formats and can also satisfy the demands of general newspaper typesetting for vertical and horizontal arrangement. The system has practical value and promotional significance and has laid a good foundation for overall format processing in the future.

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CSO: 4008/302

THIRD NATIONAL ACADEMIC MACHINE RETRIEVAL CONFERENCE HELD IN ZHENJIANG

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 1

/Article: "Third National Machine Retrieval Academic Conference Held in Zhenjiang"/

/Text/ The Machine Retrieval Specialized Group of the China Scientific and Technological Information Society convened the Third National Academic Exchange Conference on Information Retrieval in mid-December 1983. Over 120 persons representing specialized information agencies, library and archival departments, local information departments, including some from the Xinjiang Autonomous Region, computer centers and 35 institutions of higher learning across the nation participated in the activities of this conference, and over 120 papers were read.

During the conference, the Beijing Document Service /BDS/ Office systematically introduced the set up and build up of the BDS system, a data base of nearly a million documents. The paper by Wang Yongcheng /3769 3057 2052/ of Nanjing University presented some important improvements to the Toshinari Kikuchi /?/ algorithm--which is an inquiry processing algorithm which is currently widely used in selective service programs--and made public a set of selective retrieval block diagrams based on this. The Qinghua University paper entitled "The QBRS /?/ Multi-user On-line Book Title Retrieval System" introduced the implementation of a small book title retrival system which uses a domestically-made DJS-130 minocomputer with a minimum configuration. The paper by Zhang Jiwei /1728 4949 0251/ of the Data Transmission Office of the Ministry of Posts and Telecommunications introduced the on-line processing system for Chinese language personnel files and document materials using an ACOS 500 and an N6300-50S Chinese character terminal which they developed jointly with Japan's NEC. The paper by Li Sheng /2621 3932/, a doctoral student at Harbin Industrial University, presented a proposal for a library information automated data base. Yu Bing /0205 0365/, a graduate student at Shanghai Jiaotong University, attempted to use the viewpoint of fuzzy set mathematics in an information retrival system, and presented a mathematical model of a fuzzy set retrival language and proposals for its implementation.

The activities of this conference clearly demonstrated that in the one year and nine months since the Second Conference, there have been rapid developments on the computer retrieval front and great successes have been scored in theoretical research, design and testing, and user service.

IMPORTANCE OF EXPLOITING, MANUFACTURING 4-BIT MICROCOMPUTERS STRESSED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 3

/Article by Yu Zhongyu /0205 1813 6877/ Chief Eng, 878 Plant: "Put Development and Production of 4-Bit Microcomputers in an Important Position"/

/Text/ In the developed countries such as US and Japan, there were 15 series and 113 types of 4-bit microcomputer circuits in 1979 and this had increased to 26 series and 182 types, respectively by 1982. Sales volume also grew considerably year after year. The 1982 world sales volume of 4-bit microcomputer circuits had reached 140 million.

After China successfully developed the 4-bit microcomputer circuits, she also quickly developed the ability to produce them in large batches. Their application in all areas of the national economy has already produced evident economic benefits, fully demonstrating their great vitality.

At present, 29 units have started over 30 applications projects using the circuits produced by our plant. Computers have been developed in several areas: In commerce, edible oil and cotton purchasing computers, and bank interest; in industrial control, for digital linear cutting machines; and in communications and shipping, for passenger flow analysis computers. There are also such projects under development as digital instruments, optical apparatus, thermometers, and electronic scales. In the half year since our plant put 4-bit microcomputers into production, sales volume has risen very quickly so that supply cannot meet demand.

The fact that 4-bit microcomputer circuits have rapidly gone into batch production is closely connected with such characteristics as their low cost, simple structure, and ease of use. China's 4-bit microcomputers will be widely used in smart instruments and in industrial control, commercial computers, smart toys, consumer electronic proudcts, and electronic products for military use. The potential market is several millions of units. At the same time, since 4-bit microcomputer circuits are easy for China's scientific and technical personnel to master, easy to extend to other applications, there must be a wide market forming for Chinese produced computer circuits.

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CSO: 4008/302

NEW DOMESTIC PRODUCT FOR 1000-SERIES COMPUTER

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 23 Feb 84 p 1

[Article: "Another Excellent Computer in the Domestic 1000-Series Comes Out; 1152 Computer Will Soon Go Into Batch Production"]

[Text] The 1152 computer (i.e., the DJS152 computer) designed and developed by the Suzhou Electronic Computer Plant was recently formally finalized in design and will soon go into batch production. The representatives attending the evaluation meeting convened in the middle of January felt that the structural design of this computer was brand-new and rational, the performance in all areas conformed to the Ministry Standards for high grade minicomputers under the general purpose technological conditions for minicomputers.

The computer's operations speed can reach 1.4 million ips. In addition to upholding the tradition of software compatibility with similar computers manufactured abroad, in line with national circumstances the system technology of the hardware was also revised appropriately, technology was improved, a single-board CPU was developed, floating point selector channel control logic was improved, dynamic analysis and improvements were made in all components of the disk system, and the reliability of the system was improved. Thus, this computer is characterized by high speed, high capacity, flexible configuration, and abundant software, making it another newly developed high grade minicomputer in the current domestic 1000-series computer line. It will be widely used for scientific computations, education, industrial control, data processing and management.

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APPLIED SCIENCES

BEIJING COMPUTER PLANT NO 5 MANUFACTURES 4-BIT SINGLE-BOARD COMPUTER

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 23 Feb 84 p 8

[Article: "Beijing Computer Plant No 5 Puts Out New 4-Bit Computer"]

[Text] The Beijing Computer Plant No 5 recently put out a modestly priced, general purpose, and highly reliable 4-bit single board computer--BCM0200.

This computer is made up of a DG0040 series 4-bit chip produced by the Dongguang Electronics Plant and a few imported circuits. It uses open circuit design, is easy to use, and can be widely used for simple industrial process control, and for making electromechanical devices and instruments smart. Its primary performance norms are: base frequency 100 KC $\pm$ 10%; RAM uses 2114 circuit blocks with a capacity of 2K x 4-bits; ROM uses 2716, capacity of 4K x 8-bits, it uses a DG0046 interface circuit which can provide the user with four 4-bit bidirectional parallel channels, and one serial channel and 14 working modes. The user can directly apply this computer in user wired area to open 45 data lines and control lines to the outside and link up with other devices through 50 chip connector; it uses a decimal non-standard code keyboard for input, a fluorescent digital display for output, software provided to the user includes keyboard management program, digital display program, reset program, and arithmetic operator and square root extraction subprograms. A software debugging tool--DBG40.COM (it is a diskbased file for the BCM-III microcomputer system which is used by calling it from the disk together with 4-bit computer software which needs to be debugged)--is also provided.

The computer recently passed design appraisal hosted by the Beijing Computer Company. An applications system for on-line control of a cutting machine tool for this computer passed evaluation at the same time.

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CSO: 4008/1002

SHANDONG ZIBO RADIO PLANT BATCH PRODUCES MODEL QL-83 READER

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 23 Feb 84 p 8

[Article: "QL-83 Multifunction Reader Goes Into Batch Production"]

[Text] The QL-83 multifunction reader developed by the Shandong Zibo Radio Plant recently went into batch production.

Using microprocessor control, this device is both a special use EPROM reader and a single-board microcomputer. As a reader, it can do a blank check of the written chip and write addresses in any setup; it has keyboard, magnetic tape and system input and copy functions; it also has programming LED display, print output and memory transfer functions, and it has limited flow protection measures to prevent chip damage in the programming process; the sockets to change characteristics can take 2708, 2716, 2732, 2764, and 27128 and they can be programmed. As a single-board computer, its functions are identical to the TP-801.

This computer uses the qin [3830] type cabinet configuration, with the power sources inside. The switching of single-board computer and reader functions can be carried out when in the on position. The necessary reader program can first be developed through the single-board computer then the functions fixed in EPROM, thus this instrument is especially superior for developing programs.

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APPLIED SCIENCES

BEIJING GENERAL COMPUTER INDUSTRY CORPORATION REACHES NEW PRODUCTION LEVEL

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 23 Feb 84 p 1

[Article: "Beijing Computer Industry Corporation; This Year Production Strides Towards New Levels"]

[Text] Following the 89 percent increase in profits in 1983 over 1982, the 198 percent increase in profits handed over to the state, and being among the best in the nation in volume of microcomputer production, the Beijing Computer Industry Corporation has put great emphasis on industry readjustment and reorganization, made microcomputers primary, and decided to increase this years overall production level by 7.8 percent over last year, increase microcomputer output by 1.5-fold over last year, increase microcomputer peripherals by 4-fold, and push the capital city's microcomputer industry to a new peak of development.

To carry out specialized production, a division of labor according to product function and grade was carried out among those plants subordinate to the corporation which produced complete computers. In line with the three complete sets of principles of "complete sets of computers and peripheral equipment, complete sets of hardware and software, complete sets of computers and components", the entire system arranged production, readjusted the enterprise structure and product structure. To accelerate and make more effective the CRT production line imported by the Computer Peripherals No 1 Plant, the corporation decided to combine this plant with the Beijing Display Component Plant to develop the potential of the two plants. To stress development of software and production, the corporation also actively solicited funds to establish a software center.

Developing flexible trade and accelerating the pace of importing is another forceful measure for combining technological trade with accelerating the development of microcomputers. At the beginning of the year the computer corporation formulated an import policy for important items so that there would be new breakthroughs in the trade items for this year, such as importing materials for processing, compensatory trade, and jointly capitalized plants. Presently, they have signed import contracts worth $16,730,000 with foreign firms for computers and critical computer components. Such important import items as display terminal production lines continue to arrive or agreements for them are signed.

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MICROCOMPUTER APPLICATIONS SUMMARIZED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 8

/Article: "The Best of Microcomputer Applications (64)"/

/Text/ The Institute Remote Sensing Application of the Chinese Academy of Sciences recently developed a microcomputer optical plotting system. This system uses a TRS-80 as a host computer and uses parallel processing. Seven system functions, including edit /chabu /2252 5943/ /, speed control, pen control, brightness control, shutter control, symbolic board control, and tangent control are handled under software by a TP801 single-board computer and it can plot on photographic film as well as engrave on plastic film with a pen or stylus and can operate online or offline. The system can be widely used in such departments as survey mapping, electronic circuit design, light industry, geology and petroleum.

The Fujian Province Computer Center and the Fuzhou Transformer Plant cooperated to apply microcomputers to improving the design of transformers with clear economic results. They wrote a general purpose program in BASIC for the Cromemco C microcomputer. The program uses block and overlay structure. The main program includes: bootstrap, inputing norm data, computing relevant constants, and cyclical computing three large modules with selective printing modes and daobian /1418 6239/ standard program modules. Functions are very complete and it is easy and useful for designers. Using a microcomputer for design of medium and small transformers can save manpower and time, and lower product costs.

The Ministry of Railways' Fourth Survey Design Institute used an APPLE-II microcomputer for construction budget unit analysis. The institute took on the responsibility for directly drawing up the estimates and labor statistics for construction projects on the Shao-Guang, Jing-Jiu, and San-Mao lines. The computer has Chinese character functions, can print out directly on stencil paper documents which conform to design standards and saves time in text revision, printing and proofreading, reduces the subsidiary work of being handled by many people, shortens the intermediate transcription process and thus reduces the opportunity for error and improves work efficiency and document quality.

To improve productive ability and the level of product design, the Qingdao Forging Machine Tool Plant used an H-89 microcomputer for auxiliary design of forging machine tools and calculating and revising the parameters of the forge with very good results. They also used BASIC to write a general purpose program to compute the dynamic parameters of various kinds of friction forges which greatly improved the product design speed and level.

The Dalian Institute of Technology used a micrcomputer to help teach FORTRAN. The FORTRAN teaching system developed for use on the PC-8001B personal computer integrates heuristic instruction and can help the student master the design method fo FORTRAN programming and also learn computer operation with satisfying results.

FIRST COMPUTER MAPMAKING SYMPOSIUM CONCLUDES IN NANJING

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 7

/Article: "First Computer Mapmaking Symposium Convened in Nanjing"/

/Text/ The First Computer Mapmaking Symposium convened by the Geographical Society of China and the Chinese Society of Geodesy and Cartography recently concluded in Nanjing. Over 90 persons from institutions of higher learning, scientific research agencies, and production units attended this symposium. They heard nearly 70 papers, 17 of which were read at the general meetings and 41 of which were read at group meetings. The subjects on which these papers touched include: map data base management system, geographic information systems, automated production of special topic maps, remote sensing materials and application of fuzzy mathematics methods in automatic processing of mapping data.

During the meeting there was a small exhibition of the results of computer mapping done by units at the meeting.

The reports at general meetings, discussions, exchanges of experience, and observation of products made everyone recognize the achievements, broadened the field of vision, and strengthened confidence. It can be expected that at the next meeting even more results and breakthroughs in more areas will be seen.

Science Publishers will publish a selection of the symposium papers, including the complete text of about 12 of them and detailed abstracts of 15.

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APPLIED SCIENCES

MICROCOMPUTER-CONTROLLED HIGH-ALTITUDE DATA ACQUISITION SYSTEM

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 8

/Article: "Microcomputer-Controlled High-Altitude Data Acquisition System"/

/Text/ A new microcomptuer-controlled high-altitude data acquisition system has been successfully developed by the Shanghai Electronic Computer Applications Service Department. It is a high-altitude astronomical survey device designed especially for the Shanghai Observatory. The development of this system provides a new technique for data acquisition by China's astronomical, meteorological and other high-altitude experiments and opens up new territory in microcomputer applications.

This microcomputer-controlled high altitude data acquisition system is made up of a Z80 single-board computer (including 8 bit, 16 path analog/digital converter and audio frequency magnetic tape interface), 10 K memory expansion board, and keyboard and display board which can collect 16 analog signals simultaneously, and through analog/digital conversion can convert external analog signals into digital signals then encode them in a certain form through program modulation and store them on audio cassette. At the conclusion of an experiment, the data can be immediately retrieved from the tape and sent to the surface microcomputer system for data processing and analysis. In addition to this, depending on user needs, experimental data can be reproduced in analog curve form or printed out as numerical values.

The system uses a 100 x 50 cm printed circuit board which is small in size, high integrated, and of high suitability; the processing speed of experimental data is fast, and very precise. Various utility programs which were specially written for different users are solidified in modules and can be selected by users on the basis of their own work methods. A series of high and low temperature tests, and impact and vibration tests were carried out on the system to ensure that the system could operate normally in the hostile environment at altitudes of 40,000 meters. Use by the Shanghai Observatory and other units has shown that the performance norms of this system have achieved design demands and it has been given high marks by users.

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APPLIED SCIENCES

BEIJING SETS UP LONG-RANGE COMPUTER PLAN

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 1

/Article: "Vigorously Extend Computer Applications, Advance Towards Informationized City; Beijing Drafts City Computer Management Plan"/

/Text/ On the basis of the Four Directives of the Central Secretariat on the policy of construction in the capital and the state computer applications plan, relevant departments of Beijing Municipality are formulating a long-range city computer management plan to accelerate the spread of computer applications in all trades and professions, and gradually build a multilevel distributed computer network and construct a complex system from information acquisition, transmission and processing, to analysis, research, synthesis, and direction and control.

A total of 10 computer applications have been set for this year, covering a broad range of topics including: set-up microcomputer control systems for 15 intersections on two main traffic arteries, applying computers to guest registration, bed management, inquiries and billing at 8 hotels, including the Beijing Hotel, and to case, operation, and medication management at the Jishuitan and Tongren Hospitals, establishing an online system at 5 savings offices and 3 local branches of financial and banking departments, implementing computerized enterprise management at 50 units, including the Capital Iron and Steel Company and establishing an atomspheric pollution data bank and energy data bank.

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APPLIED SCIENCES

COMPUTER INDUSTRY BUREAU ESTABLISHES 0520 MICROCOMPUTER GROUP

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 1

/Article: "Founding of 0520 Microcomputer Joint Group Announced"/

/Text/ The Ministry of Electronics Industry's Electronic Computer Industry Bureau recently decided to establish an 0520 Joint Group. This work was vigorously supported by the State Planning Commission and the State Economic Commission. The Beijing Wire Communications Plant, Shanghai Computer Corporation, Fujian Computer Corporation, Huabei (North China) Terminal Equipment Company, Suzhou Computer Plant, China Computer Technology Service Corporation and its branch companies, the Ministry of Electronics Industry's 6th Bureau and Qinghua University, as well as peripheral plants of Jiannan Machinery Plant and Nanjing Wire Communications Plant have formed the joint group.

The Joint Group's main product will be the 0520 microcomputer (Changcheng-100). General sales and training will be the responsiblity of the China Computer Technology Service Corporation and its branch companies. Unified sales, pricing, publishing of materials, maintenance and service will be handled within the Joint Group.

The 0520 microcomputer is a key product of the Ministry of Electronics Industry's Computer Bureau. Supply cannot meet demand now so the 0520 Microcomputer Joint Group was established to organize its forces as quickly as possible and try to supply users with several thousand units of the product this year. Large batch supply will begin in May and June.

There has been much successful experience abroad in joint groups, and there have been some similar organizations in China, but this is a new experiment in setting up an "integrated" system joint group focusing on a brandname product. This method of concentrating forces, unifying development and distribution will play a powerful motivating role in developing national industrial superiority and smashing the barriers between departments.

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CSO: 4008/264

GRAPHIC PROCESSING SYSTEM BATCH PRODUCED IN BEIJING

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 1

/Article: "Beijing Computer Plant No 3 Batch Produces Computer Graphic Processing System"/

/Text/ When two dark shadows appear on a chest X-ray does it mean two cancers have appeared? Looking at the outlines of two indistinct and hard to distinguish dark shadows, it is hard for a doctor of internal medicine at Liberation Army Hospital to reach a conclusion. But when the X-rays are analyzed by the image processing system of Beijing Computer Plant No 3, in a few minutes the outlines of two completely different things--a tumor and soft tissue-ppear on the display screen.

Just like the problems of X-ray diagnosis and chromosome classification in medicine, in observation of global resources, waterpower exploration, earthquake forecasting, meteorological analysis, flaw detection in industrial materials, tracking and monitoring of military targets and visual sense of robots there are many technical problems of image processing that urgently need to be resolved. In the past few years, some universities and technical schools and scientific research units have developed several image processing systems, but an system which can be industrially produced has not yet come into being and a great many users can only lament that they cannot import the advanced and costly ones from abroad.

To fill this gap, without any reservations the Radio Department of Qinghua University took the TS-79 image processing system which they developed to Beijing Computer Plant No 3, and without any compensation Plant No 3 supplied the school with a computer for experimental purposes. Both sides began close cooperation in 1982 and in only a little over a year, they completed the task of improving the original system and expanding hardware functions and produced the first domestic batch BCM-IMG1 image processing system industrial products and supplied them to users.

This minicomputer controlled image processing system is simple in structure, advanced in design, very strong in general purpose functions. Its functions are identical to those of imported equipment, but the price is two-thirds less, which is important for promoting them.

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CSO: 4008/264

SHENIX TIMESHARING OPERATING SYSTEM DEVELOPED

Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 7

/Article: "Shenyang Computer Institute Develops SHENIX Timesharing Operating System"/

/Text/ The Chinese Academy of Science's Shenyang Institute of Computing Computer Technology recently developed the SHENIX timesharing operating system by transplanting the source program level of the UNIX operating system (version 7).

The new system was realized on a DEC LSI-11/23. The whole process took about 18 man-months and involved overall analysis and transplanting development of 13,000 lines of the UNIX (7th edition) kernel program, 7,000 lines of the Shell program and most of the standardized commands and routines. The system has now passed evaluation at the bureau level and has been handed over for use. A Chinese character operating system is also under development.

The SHENIX operating system is actually another name for the UNIX (version 7) operating system after its transplanting in China. It is completely compatible with UNIX, and in addition to having all the standard commands and routines supported by UNIX, it also supports FORTRAN 77, the C language, BASIC and minicomputer PASCAL. For this reason it can be used in many environments, such as scientific computations and data processing. Because the system was derived by transplanting the source program level, it can provide the user with entry at any level in the entire system and provide the user with an extremely convenient environment for further development.

Through regeneration methods the entire system can be matched to almost any grade machine of the PDP-11 series: 11/23, 11/24, 11/40, 11/34, 11/45, 11/60, and 11/70 machines. In addition, there are different groupings for configurations with hard or floppy disks. The system will also provide the user with a variety of DEC equipment driver programs to satisfy the different configuration needs of users. SHENIX is now divided into four technical levels.

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CSO: 4008/264

APPLIED SCIENCES

KSJ CHINESE CHARACTERS SYSTEM FOR MICROCOMPUTERS

Beijing JISUANJI YANJIU YU FAZHAN [COMPUTER RESEARCH AND DEVELOPMENT] in
Chinese No 8, 1983 pp 61-65, backcover

[Article by Wan Jialei [8001 0502 7191] and Zhang Shouyun [1728 1108 7189]
of the Chinese Academy of Sciences, Computer Center; and Zhu Qiaosheng
[2612 1564 3932], Chinese Academy of Sciences, Institute of Mathematics:
"KSJ Chinese Character System for Microcomputers"]

[Text] I. Hardware System

1. Schematic Diagram of the Hardware System
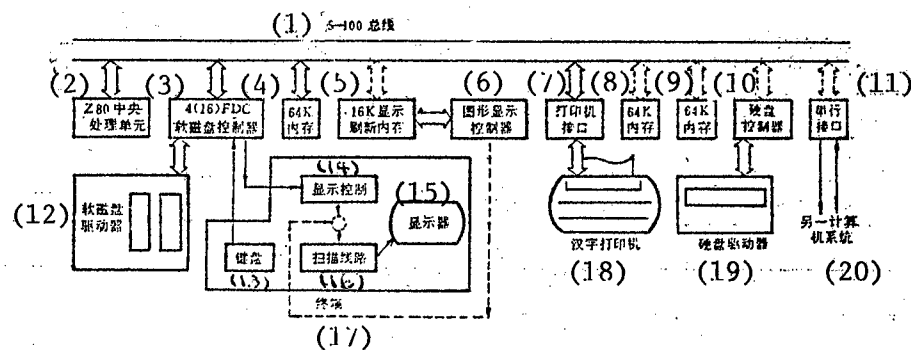
KEY: (1)   S-100 bus
      (2)   Z80 central processing unit
      (3)   4(16)FDC diskette controller
      (4)   64K internal memory
      (5)   16K display refreshing internal memory
      (6)   graphic display controller
      (7)   printer interface
      (8)   64K internal memory
      (9)   64K internal memory
     (10)   disk controller
     (11)   serial interface
     (12)   diskette drives

(13) keyboard
(14) display control
(15) display
(16) scanning circuit
(17) terminal
(18) Chinese character printer
(19) disk drive
(20) another computer system

a) Minimum hardware make up: If only Chinese character printing capability is needed, then it will suffice by: modifying an original matrix printer so that it can print Chinese characters and graphics; selecting a printer that can print either Chinese characters or graphics. At this point in time, only character-generation mode can be used to display Chinese characters. The access speed is relatively slow when the Chinese character library is stored on a diskette or a hard disk.

b) Addition of a digital-graphic-display-storage (16K RAM) and its corresponding control circuit: At this point, by adding only a CRT scan signal switching circuit to the original display unit will enable a display of Chinese characters and graphics (16 rows x 32 columns of Chinese characters or 256 rows x 512 columns of picture elements). Thus, this system has two functions. It is easy to use and legible.

c) Chinese character library stored internally: Two additional 64K RAM boards were added to the memory to be used to store Chinese characters. They are to be accessed randomly thus improving the input/output speed and avoid the wear and tear of disks and disk drives. When not in use for input or outputing Chinese characters, these memory boards can serve as an extended internal memory.

d) In addition, add a serial transmission (e.g., TUART board): At this point, the microcomputer will function as a work station to any size computer, thus avoiding any needed mainframe changes in software or hardware in order to process Chinese data. All Chinese character input and output processing, programming, testing and revising of the Chinese character system can be done at the work station without degrading the mainframe efficiency. Thus, decreasing the work-load of the large/medium size computer; increasing the system's efficiency; and expediting R&D, installation and debugging of the entire Chinese character processing system.

2. Printer modification

Generally, the printers for microcomputers can only output ASCII characters and cannot output graphics or Chinese characters. In order to be cost effective, the control program of the original printer was analyzed and we discovered that output of Chinese characters and graphics can be obtained via minor alterations in the program. This is accomplished by regarding the codes sent from the mainframe to the printer not as characters but rather as a type of graphics directly sent to the printheads. Thus, this method only modifies the control program. Another merit of this method is the ease in

incorporating new functions into the system. So far we have modified the following printers: TEXAS INSTRUMENTS-810, CROMEMCO 3703, 3703G, and CENTRONIX 704. For TEXAS INSTRUMENTS-810, only a 2K byte 2716 EPROM was added for the purpose of outputing lower case letters and special characters. For the 3703G, and 704 we needed only to rewrite the control program (6K). For the 3703, the modified results of the 3703G and 704 control program are adapted, also with a 6K memory. All the printing commands for Chinese characters and graphics are compatible with those in the original printer control program.

3. Display Modification

Within the mainframe, a 16K byte RAM was added for a display refresher internal memory centered around a 6845 large-scale integrated circuit to allow control of the original display unit. Thus, it not only allows the display of graphics and Chinese characters, but also serves as a buffer area for processing graphic information, making graphics handling software simpler. Moreover, when not displaying Chinese characters and graphics, the storage can double as main memory extension. Because the mainframe has priority in accessing the 16K RAM, the information exchange between disk$\longleftrightarrow$ display content$\rightarrow$the printer is facilitated. The address design of the 16K RAM is based on ease in graphic and Chinese character software development:

axis
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├──16──┤├ 8 ┤							7 0 7 0	
4000	4001	4002	4003	+127		403E	403F
4040	4041	4042	4043	+126		407E	407F
14 ·	·	·	·			·	·
4340	4341	4342	4343			437E	437F
4380							43BF
43c0							43FF

−256   2 1   0   7   255

0
−1
−2

x轴
axis

7c00

−128   7FFF
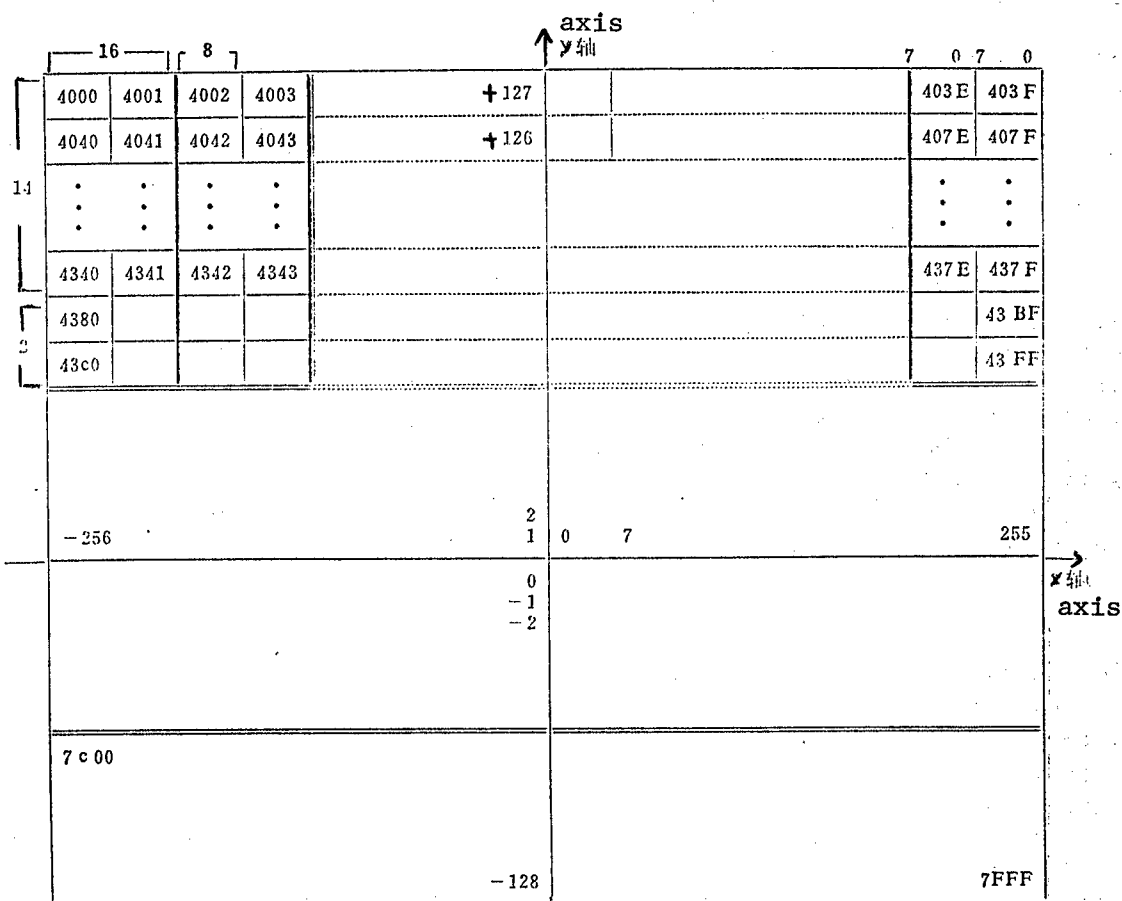
There are 64 bytes in each display row. From its high position to low position each byte corresponds to eight points on the screen arranged from left to right. The x-axis extends from $-256 \sim 255$ with a total of 512 columns; the y-axis extends from $-128 \sim 127$ with a total of 256 rows. Every 16 display rows constitute a row of Chinese characters. Of the 16 rows, 14 give the shape of characters and the 2 remaining rows designate the space between character rows. Horizontally, each Chinese character occupies 2 bytes. A total of 512 Chinese characters can be displayed on the screen (16 row x 32 columns).

Each ASCII coded character occupies 7 display rows (5 empty display rows are above it). Horizontally, a character occupies only one byte. Thus a total of 1,024 characters (16 row x 64 columns) can be displayed on the screen. The subprogram of this subroutine to read and write is as follows:

```
RDBANK:   LD    A, (BANK)          WTBANK:   EX    AF, AF'
          OUT   40H, A                       LD    A, (BANK)
          LD    A, (HL)                       OUT   40H, A
          EX    AF, AF'                       EX    AF, AF
          LD    A, 1                          LD    (HL), A'
          OUT   40H, A                        LD    A, 1
          EX    AF, AF'                       OUT   40H, A
          RET                                 RET
```

HL is the internal memory address of the information under query. Inside the A REGISTER is the content of the information. The two programs must be stored in the internal memory area of the display.

Since the 6845 is programmable, this circuit can be used on a variety of terminals with simple operation commands. Currently both the 1400 and 3102 terminals can display graphics and Chinese characters. The circuit is designed and produced by Wuxi Electronic Computer Plant.

II. Software of the System

1. Shapes and Codes of Chinese Characters

In order to meet the requirement for both printing and display, considering the fact that many printers have only 7-pin printheads, we decided to adopt the 14 row x 16 column (15 column) character shape matrix which enables the printheads to print a row of complete Chinese characters during one pass in each direction (bidirectional printing has a maximum speed of 45 Chinese characters per second). Memory space needed for a set of character forms is conserved and the processing speed is enhanced. Character forms are stored on disk in the same form and order as they are displayed according to the order of their input codes (named CHINA.DAT file). Holographic dot [?] is used with each Chinese character occupying 28 bytes. The merit for using holographic [?] code is the ease it renders in adding and altering a Chinese character and at the same time it is capable of producing non-Chinese character graphic information. During printing, the shape of a Chinese character can be transformed and output column by column:

(1) 显　示　　　　　　(2) 打　印
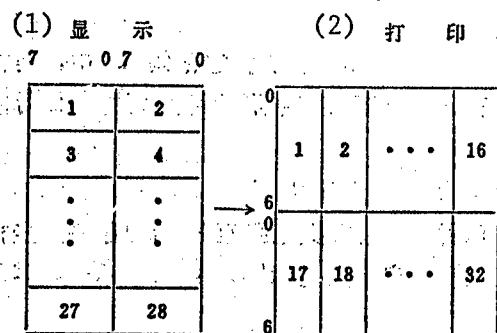
KEY: (1) Display
     (2) Print

Auxilary Storage
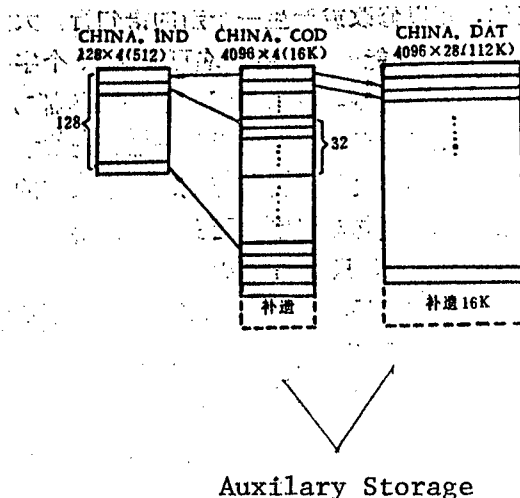
Figure 2

To cope with the fact that there are different sets of codes, our system is designed to accommodate the differences (as long as the code length does not exceed 8 bits. The entire Chinese character library consists of 3 files: CHINA.COD, CHINA.DAT and CHINA.IND. (See Fig. 2) CHINA.COD is the major file and it contains the input codes for all the Chinese characters of the system ranging from the smallest code to the largest. We search the CHINA.COD file to determine if a certain character exists in the system, and if so, to obtain its internal code (2-byte long). Using internal code can hasten the search for character shape. To increase search speed, we established an index file: CHINA.IND which indexes every 32nd record in the CHINA.COD file. At the start of each job, CHINA.IND is loaded into the internal memory to be used for fast binary search. Once the physical record of the CHINA.COD file is located we proceed to do a sequential search in the record. There is an area for addition at the respective ends of the COD file and the DAT file to store those newly added characters. Search speed in these areas is slower. There is a one-to-one correspondence between the DAT file and the COD file, thus the character shapes can be located from their internal code with a simple computational table look-up procedure. DAT file is solely used for Chinese character output.

The current Chinese character library contains all the Chinese characters
existing in the State standard primary character library plus a number of
special characters and additional Chinese characters to a total of 4040
character shapes. Up to now Chinese characters are stored in accord with
standard telegraph code, state standard code, and the Jian Zi Shi Ma
[6015 1316 6221 4316] (Discerning code by the shape of a character)
developed by comrade Zhi Bingyi [2388 4426 1744]. It is also easy to
incorporate any other Chinese character code into our system.

Six pieces of software are used to manipulate the Chinese character library:
a) To display the Chinese character and its code; b) to modify the shape of
a Chinese character; c) to add new characters (corresponding codes and forms);
d) to select character library; e) to transform character forms; and f) to
change the input code system.

2. HANBASIC interpreter

We have incorporated a new data type into BASIC--Chinese character strings
and their variables. We also increased corresponding capabilities for
management of I/O, etc. The system offers a clear concept pertaining to the
Chinese characters. Programming the Chinese characters for I/O is easy,
short, and efficient. It saves internal storage and disk space. It is
convenient for users. Thus, forming a unique interpreter with the following
additional major capabilities (standard telegraph code is used in the
examples):

a) Chinese character string--Single quotation marks enclosing the Chinese
character code is defined as the Chinese character string with length equal
to number of Chinese characters x 2. For example, '0022 0948' is the Chinese
character string, meaning '中国' ['Zhong guo' (China)], and thus occupying 4
bytes.

b) Chinese character string variables--Adding an exclamation mark (!) after a
variable name indicates that this is a variable of a Chinese character
string. Its operation is the same as ASCII character string variables.
For example: A!='0022 0948':B!='0086 3046':C!='4430 1331 7108', then, the
meaning of D!=A!+B! is '中国人民' ['Zhongguo Renmin' (Chinese People)]. However,
E!=A!+C! expresses '中国科学院' ['Zhongguo Kexueyuan' (Chinese Academy of Sciences)].
For Chinese character string code variables with more than 5 characters the DIM
statement is used to specify the length (2 x number of the Chinese characters).
The statements DATA/READ, PUT, GET, INPUT, PRINT; and word-serial [?] POS, LEN,
etc. can all be applied to Chinese character strings and their variables.

c) Chinese character output statement--To output Chinese character strings
as stored code PRINT, @ statements are used. However, to output Chinese
characters, the ? statement is used. This allows for a mixed output of
Chinese characters. Generally, ASCII strings and values also allow the
mixed use of pack (PACK) normal (NORM) and expand (UNPACK) to alter the
three types of character shapes (including Chinese characters, characters,
and numbers). Besides preserving the original statement capability such as
' ; ', SPC, TAB, USING commands, other statements are added GAP (fixed distance

between Chinese characters), CRLF (fixed distance between Chinese character rows, etc. in order to satisfy the needs for all sorts of complicated output forms.

d) The function for processing table headings—Headings which are used repeatedly can be stored in A\$ using A\$=CHR\$(%6380%), then referring to it in a statement A=USR (%53A4%, ADDR(A\$)) when needed. This function saves the trouble of having to look repeatedly for the same character shape from the disk. It is fast.

e) Commands and functions of the display unit—To clear the screen (CLEAR), to flash the cursor (CURS Y,X), to copy content of the display to the printer (Copy L_1, L_2), to place a point on the screen (can be either a lighted point or an unlighted point), to draw a straight line on the screen (given both starting point and ending point on the coordinate or given only the ending point), to invert the light of the screen, to read a disk to the display, or to write display content to disk, etc.

f) The edit command, EDIT—It is used for adding, deleting, or changing, a line by means of a simple method of moving the cursor around, thus it greatly enhances program editing and debugging procedures.

g) Other capabilities—such as the length of variable names can be up to 10 characters; execution of one instruction at a time; the function of finding the address of a variable by ADDR (variable); converting a number to hexadecimal (character strings?), HEX\$ (number); etc. These and others have all improved the performance of the system.

Some advanced techniques are used in HANBASIC. Such as: Open all files in the Chinese character library (data bank) so that files can be accessed simultaneously from different statements during operations. For each input or output of Chinese characters only one shift of position in magnetic head is needed thus greatly shortened the I/O process. General processing instructions are executed independent of the Chinese character library.

```
                    INPUT, ENTER DATA
                    ————————————————————∧ →                  CHINA.DAT
input code      CHINA.IND               Internal code  ——————————————→  Character
                CHINA.COD                                    ?    ∧ →      shape
             ←—∧————————————————————
                    PRINT, @
```
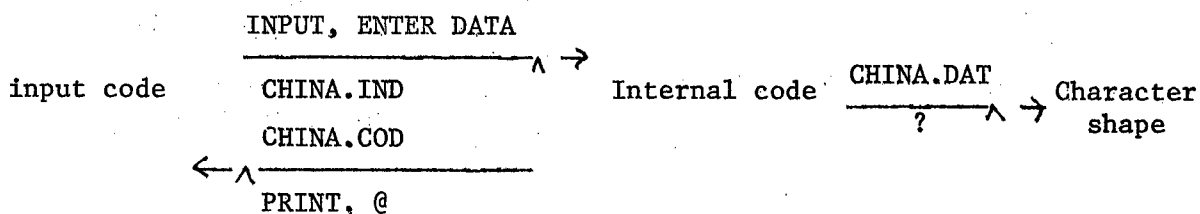
HANBASIC is larger than extended BASIC by 8K which includes 3K for the printer buffer area, 1K for the library of the ASCII coded character shapes, a CHINA.IND file of 512 bytes, a file control module of 330 bytes. This system provides users with the largest internal work area.

3. Chinese Character Output Using Extended BASIC

To fit character strings into a regular BASIC program, it is only necessary to follow this format:

Chinese character:

```
        1     1  ┌──────28──────┐
      ┌─────┬─────┬──────────────────┐
      │     │     │                  │
      │     │     │ character shape in DAT │
      │     │     │                  │
      └─────┴─────┴──────────────────┘
         ↑     ↳ distance between characters 0~127 column
```

character size (1-reduced, 2-regular, 3-enlarged)

Character:

```
      1
    ┌─────┐
    │     │ ── ASCII code
    │     │
    └─────┘
```

End:

```
      1
    ┌─────┐
    │ OF  │
    │     │
    └─────┘
```
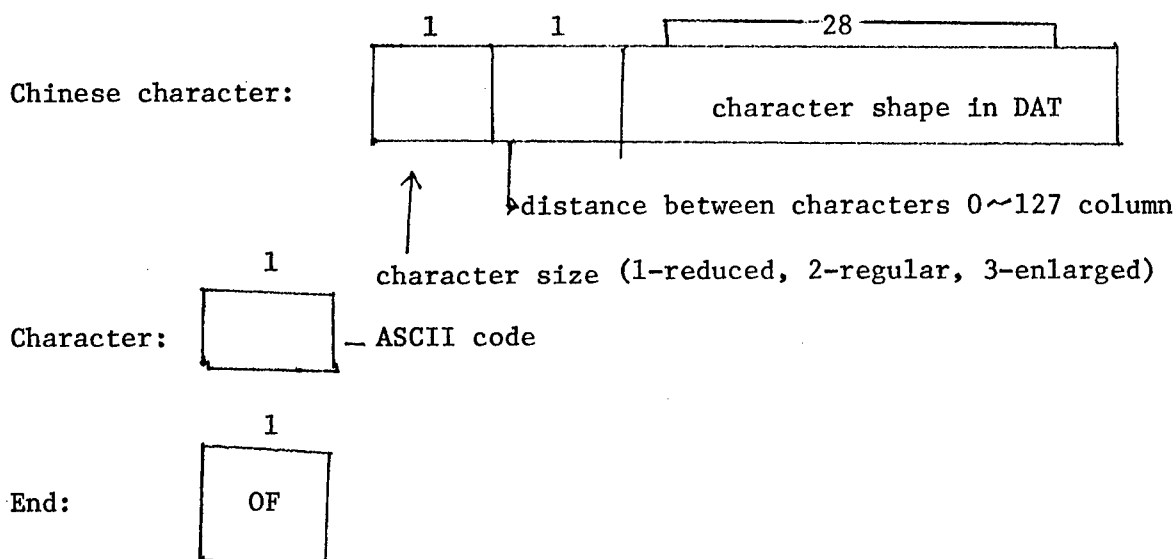
Using the assembler subprogram, USER2.COM, character string information
of Chinese characters and symbols in codes are converted into the Chinese
character shapes stored in the printer buffer area. The use of an
additional assembler subprogram, USER3.COM, prints out the content. These
two subprograms are placed in the original BASIC assembler area. The
system provides for the standard BASIC program for Chinese character shape
lookup, character size and distance regulation and the program to load the
two subprograms for convenient application without complicating the original
BASIC program.

4. All-purpose Chinese Character Data File Management System

Presently, only English data file management systems are available in and
out of China. Building up from the foundation of our English (Zhu Data File
Management System), we have widely solicited user opinions and designed
ZDFMS--an all-purpose Chinese character data file management system which
has preserved most of the English features while it also added the capability
to process Chinese characters. Chinese characters are used for man-machine
interface, thus allowing users who do not have English and computer competence
to handle it directly. The system consists of three independent programs and
16 utility modules. Its operating system takes 13K memory space. Following
are descriptions of some of the programs:

2) Bootstrapping--The system is equiped with security provisions for both
program and data. Protection is by user passwords and correct responses to
questions on file names posted by the display screen before they can access
a file. Highest priority level users may alter their security system as time
goes on.

b) Program for file development--"ZDFMS" is an all-purpose system. It
processes abstract items, records and files. However, it can regulate the
parameters of each utility module only after the major file names, category
name for each item, English name, Chinese name, user passwords and limit
of use have been input. 15 independent files can be in operation in this
system.

c) Master control program—This is the main program of the system which generates all the parameters needed for the system. It contains the common subroutines used by different utility modules and regulates the operations of the modules at the requests of users.

d) Utility modules—A total of 16 are listed as follows: data input; modification, deletion, search and output records; sort program; keeping statistics; checking index; classifying index; computing sums, average values and average variances; tabular output; overall system statistics; updating and automatic classification; selecting items to be modified; computing among items; modifying data structure; inquiring about data structure; sequential revision of all the records; and linking auxiliary records.

5. Chinese character operating system

In order to use Chinese characters in assembly, FORTRAN, COBOL, and PASCAL languages, we have inserted the CHINA.COM file into the operating system for the I/O of Chinese characters. When needed, the command CHINA moves the file to main memory and the file can then be commanded using the original forms of commands. The structure of the Chinese character string is as follows:

$$\longrightarrow \uparrow X \longrightarrow \text{input code} \longrightarrow \text{empty space} \longrightarrow \uparrow X \longrightarrow$$
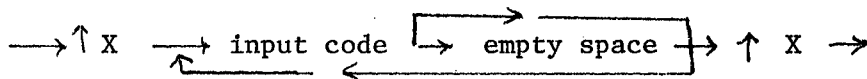
The form of the Chinese character command is:

$$\longrightarrow \uparrow \longrightarrow \text{command character string} \longrightarrow : \longrightarrow$$
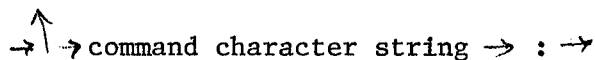
Commonly used commands are: PACK, NORM, UNPACK (for varying character size); HOME, CURSOR Y, X; ASCCRT, HANCRT (for selecting screen mode); ASCDSP, ASCPRT, ASCDAP (character display, printing, display and printing); HANDSP, HANPRT, HANDAP (Chinese character ways of display, printing, display and print); GAP X (determine distance between characters), also set page margin, distance between rows, page length, print dots, draw lines, make hard copy of the displayed content on printer, exchange information between display and disk, etc. Since these commands are all composed of printable ASCII code characters, they are clear at a glance during editing. It is also convenient to compose Chinese character programs on other computers and later to send the completed work to this microcomputer for output through channels or communication lines.

6. Other Software

Other software included Chinese character display screen editor, reentrant CDOS, continuing disk copier, INIT, STAT, 22 PCOPY, etc to make it convenient for users to use and to promote the system.

III. Scope of the System Application

This system has been tested on a microcomputer equiped with [hardware and] software listed below, and has received satisfactory results from over 100 users.

        Main computer CPU: Z80

        Operating System: CDOS, EX+CP/M, EX+MP/M, CROMIX

        Terminal: 1400,1420, 3102 etc.

        Printer: TEXAS INSTRUMENTS-810, CROMEMCO 3703, 3703G, CENTRONICS
                704, EPSON-80, μ-82, etc,

        Disk drive: 5" and 8" diskette, hard disk

Since the software of the system is largely written in high level languages, the system is also applicable on other types of microcomputers.

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3. Wan Jialei, Zhang Shouyun, and Gong Huisheng, "NEWBASIC--Improvement over the CROMEMCO Extended BASIC," JISUANJI YANJIU YU FAZHAN, No 12, 1982.

CSO: 4008/11

APPLIED SCIENCES

COMPUTER APPLICATION IN ATOMIC ABSORPTION SPECTROMETRY

[Article by Hu Xinyao [5170 9515 1031] and Zhang Liangping [1728 5328 1627],
Department of Chemical Engineering, Qianghua University: "Determination
of Calcium, Magnesium and Sulfate Radicals, etc. Contents by Atomic
Absorption Spectrometry with Computer"]

[Text] Introduction--In the past, the presence of sulfates seriously
interfered in the measurement of calcium and magnesium by means of the
chemical separation method or the spectrometric method of changing the
spectrum condition [1-4]. In this article, instead of chemical separation,
we set up a mathematical model using the method of computer-atomic absorption
spectrometry to determine and calculate directly the concentrations of
calcium and magnesium and the concentration of the interfering sulfate
radicals. The computer processing method and the mathematical model can be
used to measure other elements under similar conditions.

Experiment

1. Conditions of the atomic absorption spectrometric analysis: Instrument
used is Model AA-610S of Shimadzu Corp of Japan. Air-acetylene flame, and
a single-slit burner are used. Detailed conditions are listed in Table 1.

Table 1. Conditions for Measuring the Atomic Absorption Spectrum

	Calcium	Magnesium
Acetylene flow rate (liter/minute)	0.5	0.5
Air flow rate (liter/minute)	9	9
Height of burner (mm)	4	4
Slit length of burner (cm)	10	10
Electric current for lamp (mA)	8	8
Narrow slit (mm)	0.1	0.1
Wavelength of absorption line (A)	4227	2852

2. Results of experiment: From a sample containing calcium, magnesium,
sodium and sulfate ions, we plotted the working curves for pure calcium and

pure magnesium respectively. Based on these curves, the interference from other individual components and from the combined components are studied. The data thus derived are directly used as coefficients for the regression mathematical mode. Based on the error requirement of each element we made continuous revisions and selections. Finally we established the arithmetic functional relationship among all the elements—the mathematical model.

When hydrochloric acid is in the 0-0.5 N range, its varying concentration shows no apparent effect on calcium and magnesium, nor is there apparent mutual effect between calcium and magnesium. When calcium concentration is within the range of 0.5 microgram/milliliter, there is no apparent effect of sodium on calcium. The effect on the calcium working-curve by different sulfate radical concentration is seen in Fig. 1 where the working-curve of calcium is influenced by the combined effect of its own concentration and the concentration of sulfate radicals, thus constituting a nonlinear relationship within a certain range.

As the magnesium concentration varies within the range of 0-0.7 microgram/milliliter, interference occurs by both sodium and sulfate radicals. Based on the data gathered from measurement we draw Figure 2 and Figure 3. The working-curve of magnesium will be affected by 3 factors, i.e., the concentrations of sulfate radicals, sodium and itself. Thus, it constitutes a nonlinear system of surfaces function.
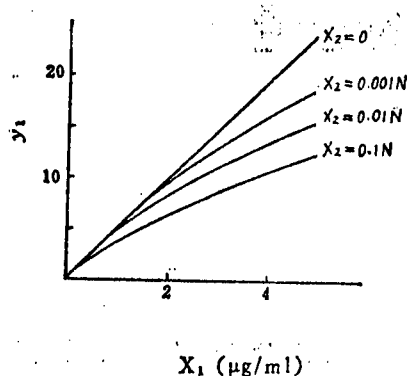
Fig. 1 (1)
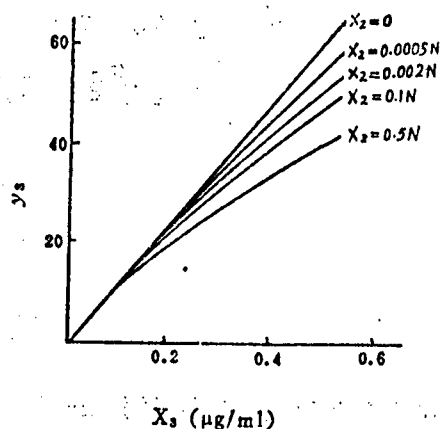
Fig. 2 (2)

(1) Effect of Sulfate radicals (X_2) on Calcium (X_1)

(2) Effect of Sulfate radicals (X_2) on magnesium (X_3)
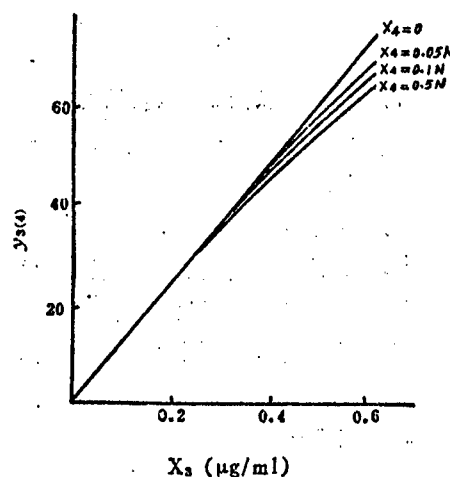
Fig. 3 (3)

(3) Effect of Sodium (X_4) on Magnesium (X_3)

In the experiment, the sample contains ions of copper, iron, chlorine, etc. No apparent effect is observed concerning calcium and magnesium measurements. Based on the data from the above experiment we derive the needed mathematical model (formula) by regression.

The Construction and Calculated Results of the Mathematical Model

We select the functional relationship based on the shapes of the curve changes in Figures 1, 2 and 3. The curve is categorically similar to that of a parabola. The mathematical model is established on the premise of minimum error differences between the mathematical model and the experimental data, ease in solving the equation, and it does not create a lot of values as prerequisite of a mathematical model.

(1) Based on Fig. 1, if X_1 and X_2 represent calcium and sulfate radical concentrations respectively, y_1 represents the light absorption values (expressed in 0–100 gradients) measured from the spectrometry when X_1 and X_2 are both present, then, y_1, X_1 and X_2 together make up the polynomial mathematical model:

$$\lg X_2 = a_1 + a_2 X_1 + \frac{a_3 y_1}{X_1} + \frac{a_4}{y_1^2} + \frac{a_5}{y_1} + \frac{a_6}{y_1^3} \qquad (1)$$

Having determined the relationship of the above equation we can derive the values of a_1 to a_6 using the method of least squares and ensuring minimal error, the following coefficients can be determined via a computer using the regression equation (1):

$a_1 = 0.5968$, $a_2 = -0.1337$, $a_3 = -1.078$, $a_4 = -167.0$, $a_5 = 33.91$, $a_6 = 269.8$

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(2) In Figures 2 and 3, if X_3 and X_4 represent magnesium and sodium concentrations respectively, concentration y_3 is the light absorption degree value measured by spectrometry when X_2, X_3 and X_4 coexist. Then, based on the previous principle y_3, and X_2, X_3, X_4 constitute the following polynomial mathematical model:

$$y_3 = 120X_3 - [b(X_2) + c(X_4) - 2a]X_3^2 \qquad (2)$$

$$b(X_2) = \frac{b_1X_2^2 + b_2X_2 + 0.01a}{-b_3X_2^2 - b_4X_2 + 0.01} \qquad (3)$$

$$c(X_4) = \frac{c_1X_4^2 + c_2X_4 + 0.01a}{-c_3X_4^2 - c_4X_4 + 0.01} \qquad (4)$$

Using the least squares method and ensuring X_3 conditions for minimum error, the coefficients of regression can also be determined from equations (3) and (4).

(3) Computation results: (1) The concentrations of X_1 (calcium) and X_2 (sulfate ions) are calculated. The y_1 value of the sample is determined directly from the spectrometer. Then we add sodium of known standard concentration K_1 into the same sample (The volume change of the sample must be within permissible error range before and after the addition). Next we measure the light absorption degree value of $y_1 + k_1$ for the sample. For the same sample X_2 should be kept constant before and after adding K_1. We derive simultaneous equation (5) from formula (1):

$$\left.\begin{array}{l} \lg X_2 = a_1 + a_2 X_1 + \dfrac{a_3 y_1}{X_1} + \dfrac{a_4}{y_1^2} + \dfrac{a_5}{y_1} + \dfrac{a_6}{y_1^3} \\[3mm] \lg X_2 = a_1 + a_2(X_1 + K_1) + \dfrac{a_3 y_{1+K_1}}{X_1 + K_1} + \dfrac{a_4}{y_{1+K_1}^2} + \dfrac{a_5}{y_{1+K_1}} + \dfrac{a_6}{y_{1+K_1}^3} \end{array}\right\} \qquad (5)$$

Results from computer computation of the above simultaneous equation are shown in Table 2 (sample contains X_3, X_4, Ca, Fe)

Table 2. Results of Measuring Calcium (X_1) Coexisting With Sulfate Ions (X_2) and Concentrations of X_2

№	光谱测定参数(1) 增 量(2) (4)		K_1(3) (微克/毫升)	配制标准 (5) (微克/毫升)	X_1 (6) 计算值 (7) (微克/毫升)	(8) 相对偏差	(9) (11) X_2 配制标准 (10) (当量浓度)	计算值 (12) (当量浓度)	(13) 相对偏差
	y_1	y_{1+k_1}							
1	11	12.5	1	4	4.06	0.016	0.10	0.11	0.09
2	9	12.5	2	3	2.96	0.013	0.10	0.099	0.006
3	12.5	14.5	2	5	5.21	0.043	0.10	0.12	0.25
4	6.5	11	2	2	1.94	0.032	0.10	0.091	0.08
5	10	16.5	2	2	2.12	0.064	0.001	0.0017	0.72
6	3.5	9	2	1	1.00	0.00	0.10	0.11	0.08
7	5.5	13.5	2	1	1.06	0.063	0.001	0.0013	0.37
8	5	8	1	1.5	1.42	0.055	0.10	0.07	0.27
9	8	12	1	1.5	1.56	0.043	0.001	0.0011	0.07
10	10	13	1	2.5	2.38	0.046	0.01	0.0055	0.44
11	8	12	2	2.5	2.46	0.013	0.10	0.083	0.16
12	10	15	2	2.5	2.56	0.026	0.01	0.011	0.10
13	11.5	18	2	2.5	2.43	0.026	0.001	0.0011	0.10

KEY: (1) Parameters for spectrum measurement
      (2) Amount of increase
      (3), (5), (7) Microgram/milliliter
      (4), (9) Standard compound
      (6), (11) Value for calculation
      (8), (13) Relative deviation
      (10), (12) Concentration

(2) Calculating the Mg Concentration. As before, measure the light absorption degree value y_3 of the sample which contains X_3. Add the known concentration of magnesium K_3. Measure the light absorption degree value y_3+K_3 for $X_3 + K_3$. The value of X_4 should be kept constant before and after the addition of K_3. The simultaneous equation is (6):

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Table 3 is the calculation of X_3 derived by computer when X_1, X_2, X_3, Cu and Fe coexist.

Table 3. To Determine the Magnesium Concentration (X_3) When Sulphuric
Acid (X_2) and Sodium (X_4) Coexist

№	光 谱 测 定 参 数(1)		增 量(2)	(4)	X_3 (6)		共存X₄
	y_3	y_3+K_3	K₃ (3) (微克／毫升)	配制标准 (5) (微克／毫升)	计 算 值 (7) (微克／毫升)	(8) 相 对 偏 差	(9) 当量浓度
1	51	61	0.20	0.50	0.531	0.063	0.05
2	48	61	0.20	0.50	0.494	0.012	0.10
3	22	41	0.20	0.20	0.196	0.015	0.05
4	41	61	0.30	0.40	0.393	0.017	0.05
5	22	51	0.30	0.20	0.193	0.034	0.05
6	22	64	0.50	0.20	0.196	0.018	0.05
7	40	63	0.30	0.40	0.383	0.042	0.05
8	23	40	0.20	0.20	0.212	0.064	0.05

KEY: (1)   Parameters for spectrum measurement
(2)   Amount of increase
(3), (5), (7)   Microgram/milliliter
(4)   Standard compound
(6)   Value for calculation
(8)   Relative Deviation
(9)   Concentration

Results and Discussion

When the measurement of calcium and magnesium is being interfered with by the presence of sulfate and sodium ions, we can use instead a computer to identify the correct mathematical model and then directly compute the concentrations of calcium, magnesium and the interfering factor, sulfate radicals without separation. The coefficients can be calculated based on the light absorption degree value measured through the method of increasing amount. Data can be handled by microcomputers or calculated individually. A more convenient way is to connect the computer to an atomic absorption spectrometry to do real time processing. The X_1, X_2, and X_3, X_4 in the mathematical model not only represents the special group described in this article but they can be applied to the computer processing of other similar groups. In the experiment we obtain the progressive average of y_1 and y_3 to reduce error.

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CSO: 4008/11

BRIEFS

NEW DEVELOPMENTS--On the basis of an indepth analysis of PDP-11 software and hardware characteristics, Chengdu Plant 132 Digital Control Station developed the AMP132-83 disassembler. Recently, this disassembler was debugged and the design was finalized and it was used to disassemble the initial bootstrap program in ROM, the secondary bootstrap program on a floppy disk, and the RT-11 system monitor program and a program text in standard assembly launguage format was obtained. Using an RS-232C communications interface the Electronic Computer Institute of the Academy of Railway Research recently successfully linked a "North Star" microcomputer with a CCS computer, CROMEMCO computer, and LSI-11/23 computer separately. Through the hookup they transferred between them software under CP/M operating system support, including such editing programs and word processing programs as TED, Word Master, and Wordstar, assemblers such as ASMB, ZASM, and MAC, debugging programs such as SID, DEBUG, and ZDT, compilers and interpreters such as ALGOL, BASIC, PASCAL-80, PASCAL/MT+, and dBASE II data base software, SuperCalc spread sheet programs, etc. The Shenyang Institute of Computing Technology of the Chinese Academy of Sciences recently successfully transferred dBASE II to a TRS-89(I) microcomputer. The new system has already been handed over to users and can be copied by users onto a floppy disk. The Guangzhou Regional Institution of Higher Learnings recently established a Computer Software Development Corporation under the Scientific Research Development Center. The company's main tasks are: absorb, transform and improve imported software and hardware; research and develop relevant software; provide software service and consulting to users; and to organize production and train personnel. /Text/ /Beijing JISUANJI SHIJI /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 6/ 8226

NEW COMPUTER SYSTEM DESIGNS--The Computer Center of the 611 Institute, Ministry of Aeronautics, used a DLV11-J four channel asynchronous serial interface board to connect a PDP-11/23 to an SR-6602 smart multiple pen plotter. The printer channel on the board was retained, a plotter channel was added, and the printer and plotter can print output or plot separately on the basis of the program. The new system has plotter interface driver software and a plotting applications program so that the user can use high-level languages like FORTRAN IV directly. The North China Computer Institute has designed a D32-1/AQ contact resistance stability tester which can test the contact resistance stability of various types of components, switches, and relays and has stron ability to resist interference. This product will be produced in small batches by selected plants. /Text/ /Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 7, 8 Apr 84 p 7/ 8226

REFINERY USES MICROCOMPUTER MONITOR SYSTEM--The microcomputer monitor system for the catalytic cracking process at Harbin Oil Refinery passed evaluation yesterday. This was the first attempt in China to use a microcomputer to monitor the petroleum catalytic system. This system was developed by the joint effort of Heilongjiang Institute of Applied Mathematics and this refinery. [Text] [Harbin HEILONGJIANG RIBAO in Chinese 17 May 84 p 1]

DJS 155-1 MINICOMPUTER PASSES EVALUATION--The DJS 155-1 ruggedized minicomputer, suited for use in field conditions such as vehicle and ship loading, was developed by the Tianjin Municipal Institute of Electronic Computers based on the Institute's high-grade DJS 153 minicomputer and passed evaluation in Tianjin recently. The performance of this computer is basically the same as that of the DJS 53: word length is 16 bits, fixed point addition speed is 1.25 MIPS, it uses CMOS memory, NMOS memory and EPROM. In order to improve reliability, all parts and components went through rigorous screening, thus the mainframe can work at temperatures between -10°C - + 45°C. This computer can be used with a variety of ruggedized peripherals, such as the CYD 1302-P and CYD 1302-KSR ruggedized stylus printers, the RDG-7 ruggedized paper tape reader, model HDG-1 perforator and model ZD-1200 ruggedized character display. The DJS 155-1 has been in operation for 1,000 hours from first testing until appraisal without any malfunctions. /Text/ /Beijing SIJUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 1/ 8226

COMPUTER APPLICATIONS IN FISHERIES--The China Aquatic Science Research Institute recently convened an Exchange Meeting on Applications of Computer Technology in Fisheries in Wuxi. Over 60 representatives from aquatics products scientific research and educational departments attended the meeting and presented over 50 papers. Many of these papers were of a high level and showed practically beneficial results. For example, the joint effort of the Shandong College of Oceanography, the Dong Hai Institute of Aquatics Products, and two other aquatics products institutes succeeded in using computers to do mid-range forecasting of water temperature and salinity of a large area of coastal waters reaching a higher degree of precision. Thus, not only were the basic needs of fishery production satisfied but valuable information was also provided for related topics in oceanography. Now, concerned state departments have been made this achievement as part of daily forecasting mission. Another example, the establishment of an automated fishing condition survey report system, enabling the integration of wireless and wired communications with a Z80B microprocessor (at the Huang Hai Aquatic Products) or a minicomputer (at the Nan Hai Institute of Aquatic Products) for rapid transmission, storage and processing information of fishing condition to provide a basis for leadership departments in directing fishery production. Aquatic products departments also utilize computers for evaluating ocean and fishery resources, improving computation of fish fodder directions, research on keeping aquatics products fresh, statistical analysis of fishery reports and materials, etc. The meeting also discussed ways to expand application of computers in fisheries and drafted some preliminary plans for future development. /Text/ /Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 1/ 8226

NEW PRODUCTS--The DJS-21 computer FORTRAN IV compiler system (XRFOR) jointly developed by the Institute of Mathematics of the Chinese Academy of Sciences, the Design Institute of the Ma'anshan Iron and Steel Company, and the Design Institute of the Changsha Ferrous Metallurgy and Mining Company, recently passed evaluation. This compiler system has good portability, and is easily transferred for use on other domestic computers. The Beijing Changcheng Wireless Plant recently put out a DZTX-1 general purpose text and graphics display terminal. Due to its powerful functions (see details on page 10 of No 20, 1983 of this paper) this terminal has been well received by customers and the plant has already decided to go into batch production. Price is set for RMB 5,860 yuan. /Text/ /Beijing JISUANJI SHIJIE /CHINA COMPUTERWORLD/ in Chinese No 1, 8 Jan 84 p 7/ 8226

CSO: 4008/302

LIFE SCIENCES

REFORMS IN PSYCHOLOGICAL RESEARCH DISCUSSED

Shanghai XINLI KEXUE TONGCUN [INFORMATION ON PSYCHOLOGICAL SCIENCES] in
Chinese No 1, [Jan] 85 pp 1-3

[Article by Pan Shu [3382 5486]: "Concerning Problems in the Reform of Chinese
Psychology--The Opening Address To the Fifth National Scientific Conference of
the Chinese Psychology Research Institute"]

[Text] The national scientific conference of the Chinese Psychology Research
Institute has been convened after the 3d Plenum of the 12th CPC Central Com-
mittee discussed and passed the circular entitled "Resolution of the Communist
Party of China and the Central Committee On the Restructuring of the Economic
System," which is of great guiding and historic significance to China's future
modern socialist construction. It has also been convened under excellent cir-
cumstances as China experiences great expansion in her modern socialist con-
struction subsequent to uprooting disorder and returning to the right path,
and as she is about to experience even greater development under the guidance
of this "Resolution."

In the past few years China's modern socialist construction has made great
strides and is advancing full steam ahead. The demands of this kind of objec-
tive situation on psychology are more numerous and more intense as time goes
by, and future demands will be so to an even greater extent. This also poses
a general and completely practical problem for the field of psychology in
China. That problem is how to keep pace with excellent current and future
situations? This is the major and most urgent problem that we must consider
at this national scientific conference.

If we are to consider this major and most urgent problem, we must first con-
sider that it is a problem of "reform." Our educational system is in great
need of major reform. Our scientific research system is in the process of
considering and beginning to implement major reform. In science, it is the
psychological research and education systems that are most in need of major
reform. If no major reform is forthcoming in the psychological research and
education systems, we must believe that it will be very, very difficult, or
even impossible, for us to keep pace with the excellent situation under the
four modernizations.

It is correct to say that since we have uprooted disorder and returned to the correct path, psychology in China has also experienced impressive development: We have considerably expanded our contingent of psychological workers, increased the number of scientific research organizations and added to or augmented China's specialized education organizations. The quantity and quality of Chinese scientific research achievements have improved notably. As for our ancient thinkers, a lot of their valuable psychological ideas are also being further sorted, studied and thus being passed on. The number of papers presented at the various scientific conferences grows greater every year. In addition to the two kinds of specialized psychological publications that are already published externally, there are also many other kinds, some of which are not yet published externally, some of which are still published internally and some of which are local publications sponsored by provincial or municipal psychological societies. Psychology books published by the various publishing houses are gradually becoming more numerous. This institute's plenary scientific conferences and the branch conferences of the various specialized committees are held regularly, and there are also many local academic activities. People working in all the areas of society concerned are gradually gaining a greater understanding of psychology and placing greater demands on it. External academic exchanges are also developing progressively in this manner. Further examples exist, but there is a single crucial and invaluable change that has taken place: the field of psychology in China has become more clearly cognizant that we must be compatible with the requirements of China's modern socialist construction and that we have much to offer to its progress. Considering these circumstances, it is gratifying that the development of Chinese psychology in the past 8 or 9 years has been so decidedly rapid. This is something that is incomparably beyond what would have been possible under the circumstances prior to the founding of the PRC.

However, we must simultaneously be aware that, by comparison with the giant strides currently being made in China's modern socialist construction, the forward momentum of development in Chinese psychology is notably inadequate. When our present course in psychological science is compared with the demands being placed on it by China's modern socialist construction, I would rather not say that the discrepancies between them are growing wider, but neither are they shrinking. This is the actual situation to which this national scientific conference must give its solemn attention and consideration, and for which it must come up with effective countermeasures. We may consider setting up a temporary committee to conduct a conscientious study of the problem and submit a research report by a certain deadline. However, the problem of shortening the gap is essentially a problem of reform. Psychological work is the same as other work in this country in that it is faced with the major problem of reform. The single most crucial goal of reform work facing Chinese psychology is that it must shorten and overcome the gap between the current state of the discipline and the demands being placed on it by the various aspects of China's modern socialist construction. Therefore, we may consider calling the temporary committee suggested above the "Committee for the Reform of the Chinese Psychological Research and Education Systems." Its major consideration must be the problem of reform in both the psychological research system and in the psychological education systems in China, but of course it must also consider other related questions.

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Concerning the problem of reform in the psychological research and education systems, I think I can briefly suggest a few tentative ideas here for the consideration of my comrades.

The problems of reform in the scientific research and education systems can both be summarized as one basic problem, namely the human factor. More precisely, this is the problem of how talented scientists can be satisfactorily trained and utilized. This is the basic problem in the scientific research system and it is likewise the basic problem in the scientific education system, though each has a slightly different emphasis. If we are to resolve this problem effectively, we must clearly recognize one fact: not just anyone can be trained satisfactorily to be a talented scientist, nor can just anyone be employed satisfactorily as a talented scientist. Herein lies the problem of rigorous and conscientious selection. One fundamental defect in our old scientific system is that it allowed us to ignore this crucial problem, and as a result very few measures were adopted to resolve it. One serious consequence was the phenomenon of "eating out of the same big pot." Actually, people in this position are not all there willingly, but our system is such that nobody has any choice in the matter. The reform of our scientific system is primarily the resolution of this basic problem, and the crucial point of the problem itself is in its complete lack of concern for the selection of training and employment for talented scientists. The situation is just the same for the psychological research and education systems, except that there the problem seems somewhat more severe. Therefore, the basic problem in reform of the scientific system lies with people, but not only with people; it also lies with the carelessly selected, unscientific system itself. Adopting other measures without realizing this point will not resolve the problem.

In discussing the training and employment of talented scientists, we are also forced to admit that training is the most important of the two. It is reasonable and simple: to employ talented scientist, there must first be a use for them. Therefore, we must discuss further the problem of training talented scientists (including those in psychology).

To train talented scientists we must clarify some of the traits which make people talented scientists. The identification of these traits is a complicated problem that we cannot discuss in detail here. However, we can point out the most important of these traits: being adept at thinking or having the ability to think independently. This is because scientific work is generally composed of relatively strong or very strong ideological work. People who are not adept at thinking or who have insufficient ability to think independently will find it hard to be fully competent. Let us now narrow our scope and talk specifically about this one problem.

The major component of a person's psychological activity is his thinking activity. Likewise, the major psychological character that science demands of one engaged in scientific work is the character of his thought or his ability to think independently when encountering or dealing with scientific problems. Consequently, the problem of how to educate and train talented scientist is

primarily a problem of how effectively to select and train people who possess the character of scientific thinking or who have the ability to think independently about scientific problems. The major problem is precisely the same for the selection and training of qualified psychologists.

Considered from this point, there are four principal areas in which our present system for training qualified psychologists needs obvious reform or improvement. First, we need to clarify our training goals: that is, what kind of person do we want to cultivate? The basic point is that we want to cultivate someone who not only has specialized knowledge, but also has the ability to think scientifically. Those who have only specialized knowledge will still find it difficult to become good scientific workers. Second, we must strengthen basic training. Basic training is also most essential to fostering thinking abilities. Current basic training for specialized psychology students is inadequate, and in particular there is not enough stress placed on psychology departments or comparable specializations in teachers' colleges. Third, we must stress core courses, which are analogous to required courses. These core courses must be taught and learned as well as is possible; they are the major component of basic training. In addition to the core courses, we must also provide some essential selective courses. The lecture time for electives should not be excessive, as it is inadvisable for the secondary to supersede the primary. However, if there is an individual student who has a particular interest in a certain elective we can allow him the opportunity for additional study. If he writes his graduate thesis in that area, in time he may become an expert in that field. Fourth, we must improve teaching methods. The teaching methods popular now in middle and primary schools stress the inculcation of knowledge and ignore the arousal of thought processes. This is using instruction to deaden people rather than to enliven them. This kind of teaching continues to be rather popular in our institutions of higher learning. It is unacceptable to use this kind of teaching method in the training of qualified scientific personnel, and it is particularly unacceptable to use it in training qualified psychologists. Our ancestors of 2,000 years ago admonished us that "rote repetition to students, without explanation, of what one has read in the classics does not make a teacher." We have completely forgotten this simple and clear lesson. The reasonable teaching method to use to produce talented scientists should be to link scientific thinking with practical knowledge and use practical knowledge to stimulate scientific thinking.

In addition, in training qualified psychologists, we must stress instruction in psychological methodology. Obviously, the guidance of a proper methodology is essential to psychological work, whether it be in research, education or applied psychology. Otherwise, it is like travelling in the dark without a lamp: the way is hard to distinguish and it is both difficult and dangerous. I submit to this scientific conference a paper discussing methodology, and will not say more about it here. In 1984, at the scientific conference held by this institute's Special Committee on Basic Theory, I took psychological methodology as one of the two central topics of discussion. Many comrades submitted papers discussing psychological methodology. The paper on methodology that I am submitting to this national scientific conference is just one voice among a hundred contending schools of thought. My goal is to "cast a brick to attract

jade," to arouse discussion and to enable discussion and research on psychological methodology to continue in Chinese psychological circles. Ultimately I hope to enable psychological circles throughout China to achieve some kind of relatively clear understanding of this very important question of methodology in order to help the development of Chinese psychology.

In addition, I wish to put forward one request. This national scientific conference gives priority to the divided academic activities of the various specialized committees in order to bring the initiative and creativity of those specialized committees fully into play and thus make the content of the plenary session even more substantial. I hope that the various specialized committees will discuss the question of setting up a planning committee to reform the psychological research and education systems in China. In addition, I hope that the respective academic activities are organized and arranged well, to make them both compact and lively and to enable everyone to profit and feel satisfied.

Finally, I respectfully wish the plenary session of this scientific conference bountiful results and triumphant achievements!

ENVIRONMENTAL QUALITY

HANGZHOU PURIFIES WEST LAKE, CLEANS UP AREA

OW051400 Beijing XINHUA in English 1124 GMT 5 Apr 85

[Text] Hangzhou, 5 Apr (XINHUA)--Picturesque West Lake in Hangzhou City will have purer water, and more architecture in ancient style, Vice-Mayor Wang Bangduo said here today.

The city is now pulling down buildings and workshops that blot the beauty of the lakeside, restoring buildings with traditional characteristics, and landscaping the verges with ornamental trees and flowers, the vice-mayor said.

Hangzhou has made marked progress in landscaping the city with emphasis on West Lake. The garden city has planted more than 200 hectares of parks, dredged West Lake, laid pipes to divert sewage from the lake area, and converted boilers and furnaces to prevent 600 chimneys from emitting black smoke and soot.

The projects under construction will make West Lake a tourist resort covering 49 square kilometers, including the 5.6 square kilometers of water and a 260-hectare ring lakeside park.

The tower built in Song Dynasty (960-1279) on the lakeside for a birds-eye view of the lake and the temporary imperial palace of the Qing Dynasty (1644-1911) on the lake isle will be reconstructed.

The Zhejiang Museum and Wenlan Pavilion, an ancient library, and other historical buildings will be renovated.

Flowers and birds park will be constructed on the northeast corner of the lakeside, where civil houses and offices have been moved.

Lotus Park, one of the 10 scenic sports on the lake, which had been occupied by various buildings and covers only about one-thirtieth a hectare now, will be restored, covering 28 hectares. The park will have strains of lotus from all corners of China.

Construction of the project to divert water from the Qiantang River to West Lake started in February and is scheduled for completion by the end of this year. The project is to feed 300,000 cubic meters of water daily, or about 3 percent of its total, into the lake which has hills on three sides. Cleansing the lake has increased the transparency of the water by one-third, according to local officials.

CSO: 4010/125

EFFECTS OF METAL POLLUTION ON HUMAN HEALTH STUDIED

[Article by Bao Keguang [0545 0344 0342] et al of Wuhan College of Medicine:
"Effects of Metals in Environment on Human Health in Areas Polluted by
Metallic Emission of A Coppersmelting Plant"]

[SUMMARY] Samples of hair, blood, and urine were taken from 100 inhabitants
of 5 villages located about 3, 6, and 9 km to the lee side of a coppersmelting
plant in Hubei Province to determine their As, Cd, and Pb contents. Soils
and grains of rice of these areas were also tested. Results are reported
in the following tables.

Table 1. Level (ppm) of Metallic Load of the Surveyed Areas

Area	Comprehensive Pollution Index [1]	Soil [2]			Rice Grain [3]		
		As	Pb	Cd	As	Pb	Cd
control zone	1.00	8.25	22.65	0.214	0.113	0.59	0.057
slightly polluted zone	1.00-1.94	19.75	38.19	0.347	0.306	0.91	0.151
mildly polluted zone	2.16-3.05	28.17	47.65	0.867	0.528	1.00	0.260
heavily polluted zone	3.16-6.70	48.68	68.07	1.240	0.845	1.49	0.489

Data of the Monitoring Station of Huangshi City Enviromental Protection Research Institute

(1) comprehensive pollution index of Cu, As, Pb and Cd.
(2) soil of rice paddies
(3) unpolished grains of early rice.

Table 2. Results of Tests of Metals in Human Bodies of Surveyed Areas

level of metal pollution		heavily polluted zone			mildly polluted zone						slightly polluted zone						control zone		
distance (km)		3.8			6.4						9.4						24		
soil pollution index		3.14~6.70			2.16~3.05						1.00~1.94						1.00		
village		F			E			D			C			B			A		
sample	test index	N	M	SD	N	M	SD	N	M	SD	N.	M	SD	N	M	SD	N	M	SD
hair	Pb, ppm(1)	70	8.98^c	2.75	91	7.01^c	2.13	112	7.60^c	2.23	84	6.94^b	2.15	110	4.50^b	1.86	77	2.95	2.80
	Cd, ppm(2)	71	0.22^c	2.0	91	0.19^c	2.05	89	0.25^c	2.65	85	0.20^b	1.81	111	0.18	2.11	78	0.06	3.00
	As, ppm(2)	69	2.06^b		89	0.86^c		119	1.83^b		107	2.91^b		110	1.60^b			0.47	
blood	Pb, ug/d/(1)	83	150.46^c	2.06	100	47.75^b	1.66	126	38.23^a	1.86	76	42.99	3.14	108	30.10	2.67	106	29.64	2.02
	Cd, ug/d/(2)	83	9.52^c		103	2.31^c		126	1.79^b		82	1.69^b		107	1.21		105	1.23	
urine	Pb, ug/l(1)	78	29.29^c	1.99	115	20.10^b	1.79	131	16.62^c	1.41	106	9.77	2.99	125	10.13	2.60	92	7.77	2.08
	ug/g·cr(1)	84	54.60^c	2.67	110	27.69	2.06	128	33.78^c	2.03	103	25.03	3.70	117	17.31	3.16	88	19.78	2.24
	Cd, ug/l(2)	78	2.11^c		115	1.61		132	1.03^c		106	0.59^b		129	0.94^c		91	0.32	
	ug/g·cr(2)	86	3.80^c		108	2.55^c		128	2.15^b		103	1.42^b		117	1.44^b		88	0.65	
	As, ug/l(2)	78	22.40^a		103	45.83^b		105	52.50^c		69	29.96^b		99	29.34^b		78	5.60	
	ug/g·cr(2)	78	52.50		102	69.44^b		104	111.82^b		64	87.50		110	49.80^b		78	15.00	

Note: (1) Geometric average   (2) Median
a) apparently different (P<0.05) from the control work
b) very different (P<0.01)
c) very different (P<0.001)

Table 3. Ratio (%) of Metal Load of Humans in Polluted Zones

Polluted Zone	number of persons in urine test			≥ 10X			≥ 20X		
	Pb	Cd	As	Pb (77.7)	Cd (3.2)	As (66)	Pb (155.4)	Cd (6.4)	As (132)
heavily	112	112	118	4.46 (5)	14.28 (16)	14.41 (17)	0	0.89 (1)	2.54 (3)
mildly	247	247	213	0.4	12.96	30.52	0.4	1.62	4.22
slightly	233	235	170	2.58 (6)	1.70 (4)	10.59 (18)	0	0	0
Total	592	594	501	2.02	8.75	19.96	0.16	0.84	239

(1) Number in parenthesis indicates the amount over 10X or 20X of the control
(2) The number in parenthesis is the number of persons tested.

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Table 4. Results of Determining Cadmium Effects on Surveyed Areas

Test Index	F			E			D			C			B			A (control zone)		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
urine Ca, mg/l (3)	81	119.2[c]	55.33	118	121.39[c]	61.55	133	101.88[c]	41.19	112	95.98[c]	56.10	130	99.41[c]	39.37	109	69.15	40.25
mg/g·cr (1)	86	174.65[c]	2.33	110	170.13[c]	1.70	130	170.72[c]	1.75	103	201.38[c]	2.02	114	136.75	1.96	96	117.88	2.25
P, mg/l (2)	82	183.6[b]		116	294.62[b]		133	323.25[b]		114	251.73		129	312.51[c]		103	241.70	
mg/g·cr (2)	89	320.6[b]		111	439.33		130	596.85		101	646.77		117	454.52		98	513.70	
Ca/P (1)	92	0.591[c]		117	0.410[c]		132	0.300		113	0.330		126	0.310		102	0.219	
blood Ca, mg/dl (3)	71	10.20	1.47	60	8.57[c]	1.53	102	8.92[b]	1.67	60	10.41[a]	1.98	97	9.50	1.89	89	9.12	2.15
P, mg/dl (3)	71	2.49[b]	0.56	60	3.88[c]	0.80	103	4.06[c]	0.89	60	4.12[c]	1.26	97	3.73[c]	0.71	89	2.82	0.58
AKP (1)	73	10.88[b]	1.77	95	24.14[c]	1.94	119	21.69[c]	1.74	86	17.72[a]	1.81	110	7.63	2.39	88	8.28	1.98

Note: (1) geometric average (2) median (3) arithmetic average
a: apparently different ($P < 0.05$) from the control
b: very different ($P < 0.01$)
c: very different ($P < 0.001$)
AKP: serum alkaline phosphatase

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Table 5. Ratio of Abnormal Cadmium Effects Among Inhabitants of Surveyed Areas

Effect Index	Base Level	incidence of base level (control area)	Incidence of Levels Exceeding the Normal (%)				
			F	E	D	C	B
urine Ca, Mg/1	147.9[a]	3.9	23.0	27.3	11.9	16.5	8.7
urine Ca/P	0.627[b]	3.9	44.4	22.8	5.2	19.1	11.7
blood AKP	21.4[c]	3.4	12.1	59.7	48.9	39.6	4.8
density of cadmium in vice, ppm			0.599	0.408	0.358	0.196	0.103

a) control area $X + 1.96 s$
b) control area 97.5%
c) control area 95%

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BIOLOGICAL INDEX OF WATER POLLUTION IN DI'ER SONGHUA JIANG

[Article by Yu Changrong [0060 1603 2837] et al of the Environmental
Protection Research Institute, Jilin Province: "Studies on the Assessment
of Water Pollution in the Second Songhua River With Biological Index"]

[SUMMARY] Samples of algae, benthos, and fishes were taken in 1982 from
the polluted water of the Di'er Songhua Jiang to study the nature and the
extent of pollution of various sections of that river. The following
table is included in the paper.

Results of Biological Assessment of the Di'er Songhua Jiang

indicator species

Fish			Benthos	Algae	Fish
number of species	jin/day/net	P/R	Benthos	Algae	Fish
2 20	1.0 3.01	0.59 0.61	Oligochaeta Hirundinea Tendipedidae	ordinary flat algae granular chain algae	crucian carp loach black carp
30	16.74	2.54	Oligochaeta Hirundinea Tendipedidae	ordinary flat algae granular chain algae	crucian carp cat fish silver carp
30~40		2.34 1.44 2.32	Oligochaeta Hirundinea Tendipedidae appearance of Trichoptera	calyptrate, rhombic, and ordinary flat algae, and the appearance of a few ulnar, needle and rod algae	mandarin fish crucian carp cat fish, loach, cod Leiocassis langirostris
40~50		2.07 1.53 1.93 2.51 2.09	Plecoptera Plankton appearance of Trichoptera	Small quantity of calyptrate, rhombic, ulnar, needle and rod etc., flat algae	grass carp, mandarin fish Erythroculter ilishaeformis E. mongli cus Parabramis pekinensis, Erythroculter sp. etc.
more than 50	more than 70	1.31 1.99 1.83 1.83 2.00 1.43 1.74	appearance of a large quantity of Odonata	ulnar, needle and rod algae dominate, with relatively complete colony structure	In the upper reaches: Lucio brama macrocephalus, Brachymy stax lenok, Hucho taimer, Phoximus, Hemibarbus maculatuso In the lake: Erythroculter ihshae- formis E. mongolicus, grass carp, variegated carp, mandarin fish

ENVIRONMENTAL QUALITY

EXPERTS HOLD MEETING REGARDING THREATENED LAKE

HK120503 Beijing CHINA DAILY in English 12 Apr 85 p 3

[By staff reporter]

[Text] Ecologists and environmental scientists are being called to an emergency
conference in Baoding City, Hebei Province, to discuss ways to save Baiyangdian,
the largest freshwater lake in the North China Plain. The lake has run dry this
spring and scientists are expected to discuss the possibility that the
336-square-kilometer-lake--known over the centuries as "the pearl of north China"--
may eventually become a sandy marsh, a report from Shijiazhuang, capital of
Hebei Province, said.

The drying-up of the lake means not only a loss of nearly 100 million yuan worth
of aquatic products for the province, but also a serious setback in the ecolo-
gical balance of the North China Plain, which is already plagued by a constant
shortage of water, the report said.

This is the fourth time in recent years that the lake has run dry and scientists
were quoted as saying that only a steady supply of water from upland rivers
can save the lake.

Some 100 kilometres south of Beijing, the lake began to shrink in the 1950's
from the original 560 square kilometres to the present 336 square kilometres,
as a result of reduced water supply from the rivers upland.

Then, following the building of big reservoirs and irrigation projects upstream,
the lake ran dry for the first time in the 1960's, twice in the 1970's and three
times since 1981. Although ecologists repeatedly expressed their concern over
the shrinking lake, a shortage of funds for the project whose cost is estimated
to be 300 million yuan has hindered efforts and measures to save the lake.

Baiyandian, located near the centre of Hebei Province, takes its water from
several tributaries of the Daqing River flowing down the Taihang Mountains in
nearby Shanxi Province.

Heavy tree-felling over the past decades, however, has disrupted the Taihang
Mountains' water resources and resulted in widespread soil erosion in the area.
Consequently the volume of water flow into the lake decreased while more and more
earth washed down from upstream accumulated in the lake and further reduced its
water content.

This, plus the building of more reservoirs upstream, caused the flow of water into Baiyangdian to decrease year after year. Records indicate the volume of water flow into the lake decreased at a rate of 30 to 35 percent every 10 years from 1950 to 1980. Then the decrease rate leaped to 85 percent during the past 4 years, hence the frequent drying-up.

The lack of adequate rainfall in the area in recent years also helped quicken the drying-up process, officials said.

To restore Baiyangdian to its past glory needs a flow of 400 million tons of water every year, experts told a current conference held to discuss the problem in Baoding City, Hebei Province.

As no such water resource is now available in the North China Plain—which includes Hebei and parts of Shandong and Henan Provinces—the only possible solution is to pump water from the Yellow River 250 kilometres away in Shandong Province experts suggested. This project, however, will cost hundreds of millions of yuan and take years to complete, they said.

However, every possibility must be explored to keep the Pearl of North China from being erased from the map, they added.

CSO: 4010/125

ENVIRONMENTAL QUALITY

BRIEFS

SHANGHAI AIR QUALITY--Beijing, 16 Apr (XINHUA)--The quality of air in the major
industrial city of Shanghai has become much cleaner over the past few years,
CHINA ENVIRONMENT JOURNAL reported today. Half of the 12 city districts are
now free of black smoke, and local officials are planning to turn the rest of
the city into similar smokeless zones by the end of the year. Falls of dust
dropped to 24 tons per square kilometer per month last year from 41 tons in
1979, and "fly ash," or fine dust suspended in the air, dropped from 0.44 milli-
grams per cubic meter in 1976 to 0.16 milligrams. After years of anti-pollution
efforts, the municipal authorities have managed to place controls on 16,000 of
the city's 20,000 furnaces, kilns and works canteens, the paper reported. [Text]
[Beijing XINHUA in English 1240 GMT 16 Apr 85]

CSO: 4010/125

AUTHORS: HAO Longsheng [6787 7893 0524]
          WANG Jiuhui [3769 0046 1145]

ORG: Both of Institute of Acoustics, Chinese Academy of Sciences

TITLE: "Acceleration Characteristics of Hydrophones"

SOURCE: Beijing YINGYONG SHENGXUE [APPLIED ACOUSTICS] in Chinese Vol 3
No 2, Apr 84 pp 39-41, 43

ABSTRACT: In addition to major factors such as sensitivity to acoustic
pressure, frequency response, and directivity pattern of a hydrophone, its
sensitivity and frequency response to acceleration, as well as the effect
of cable type and installation mode on its acceleration sensitivity, should
be understood. The acceleration characteristics of several types of hydro-
phones, including Z_{-1}, Z_{-2}, C_{M-10} and CH_{-1a} (made by Clevite Corp., USA),
were studied experimentally. In the 63 to 4000 Hz frequency range, the
acceleration sensitivity varied from several millivolts (4mV/g for C_{M-10}) to
several hundred millivolts (224mV/g for Z_{-1}) which was independent of the
magnitude of acceleration. However, it was highly directional. The
sensitivity was much higher when the direction of acceleration was perpendicu-
lar to the silver layer, but much lower in the parallel direction. Vibration
was found to be transmitted primarily through the case of the hydrophone. The
use of a soft, fine cable reduced vibration after shock isolation. It was
appropriate to use a shock isolation device when other specifications of the
hydrophone were met.

12553
CSO: 4009/86

AUTHORS: HANG Ruheng [2635 3067 5899]
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ORG: All of Institute of Acoustics, Chinese Academy of Sciences

TITLE: "Telemetric Buoy for Underwater Noise and Acoustic Signal Measurement:

ABSTRACT: The major feature of this telemetric buoy was the adoption of a
digital automatic gain control technique in conjunction with a simulated
frequency shift keying signal transmission mode (DAGC/FSK/PM) to ensure a large
dynamically compressible range in order to maintain the linear output of the
waveform of a hydroacoustic signal. The signal transmitted was also calibrated
against the FSK standard signal installed inside the buoy to directly measure
the absolute level of acoustic pressure. The buoy was made of glass fiber
reinforced plastic to avoid corrosion. It was cylindrical in shape, 90 cm in
length and 12 cm in diameter. The buoy was capable of measuring various
underwater signals, including ambient noise of the ocean, noise emitted by
boats and ships, continuous acoustic waves and underwater explosions. It
could also be used for sonar-transponder ranging. After the telemetric buoy
system was designed and fabricated in 1980, it was first tested in Xin'an
Jiang Reservoir and then placed on site in the Bohai, the East China Sea and
the South China Sea to obtain experimental data. Results indicated that the
structure could function normally in shallow sea areas with strong currents.
The telemetric range reached 3 nautical miles. It was proven to be an appro-
priate and economical device for underwater measurements. The same principle
might be used for measuring noise in the air.

12553
CSO: 4009/86

Chemistry

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ORG: Changchun Institute of Applied Chemistry, Chinese Academy of Sciences

TITLE: "Investigation on Polymerization of Conjugated Dienes With the
            Homogeneous Rare Earth Catalyst"

ABSTRACT: In this paper, the polymerization of butadiene, isoprene and penta-
diene-1,3 in the presence of a homogeneous $(CF_3COO)_2NdCl \cdot EtOH-Et_3Al$ catalyst was
studied in detail. It was found that for polymerization of conjugated dienes
with this catalytic system the activity order of different monomers is butadiene
> isoprene > pentadiene-1,3, and that cis-1,4-contents of polymers produced are
97 percent, 94 percent and 70 percent, respectively.

The dependence of the cis-1,4-contents of polymers on concentrations of monomer
and triethylaluminum and on temperature of polymerization was accounted for a
theory of isomerization equilibrium between anti- and syn- forms of the
π-allylic chain ends. Influence of various monomers on stereospecificity was
explained by the rotating easiness of groups at C_3 of π-allylic terminal chains.

CSO: 4009/100

Chemistry

AUTHORS: DING Dezeng [0002 1795 1073]
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ORG: Institute of Theoretical Chemistry, Jilin University

ABSTRACT: Using the model of overlapping sphere and optimizing the parameters,
the electronic energy levels, charge distributions, total energies and ioniza-
tion energies of the tetrahedrane(I) tetramethyl-tetrahedrane(II) were calculated
by the X_α-method on a TQ-16 computer. The computer program of X_α-method was
programmed by ourselves. Owing to the fact that the model of overlapping sphere
does not satisfy the variational principle, the virial ratio was used as a
criterion for choosing parameters. In comparison with the data of photoelec-
tron spectra of tetratertbutyl tetrahedrane(III) our calculated results show
that all energy levels of (I) are mainly determined by its molecular framework
and the function of hydrogen atoms and other substituents only make the whole
spectra shift upward as shown in Figure 2. When four hydrogen atoms are replaced
by four methyl groups, the energy levels of the framework shift upward and ioni-
zation energies become lower. The photoelectron spectra of (III) show that the
highest occupied orbital shifts move upward as four hydrogens are substituted
by four tertbutyl groups. As a result, the ionization energy of (III) will be-
come even less. The functions of the molecular framework and the substituents
are explained theoretically in this paper. Our calculated results of the
effects of different substituents coincide with the experimental results quanti-
tatively. In addition, the stabilities of these compounds are also discussed.
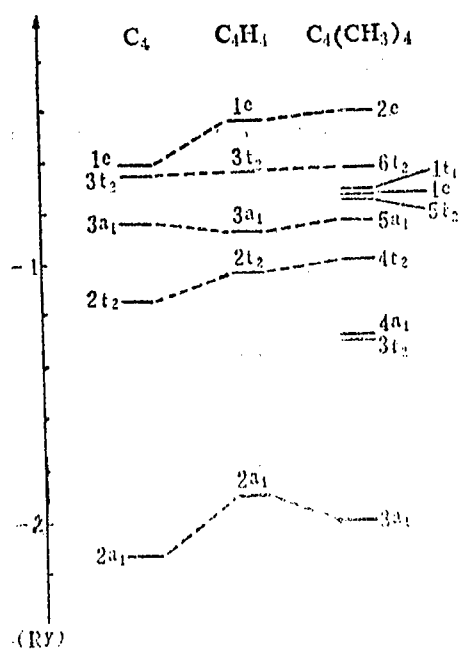
Figure   2

Chemistry

AUTHORS: DOU Shiqi [4535 1102 3823]
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               SUN Jiabin [1327 1367 3453]

ORG: Dou and Zhong of the Institute of Biophysics, Chinese Academy of
               Sciences, and Sun of the Institute of Elemental-Organic Chemistry,
               Nankai University, Tianjing

TITLE: "The Crystal and Molecular Structure of Pyridine-Thtrakis (1,1,1-
               Trifluoro-3-2-2'-thenoylacetonato) Praseodymium(III)"

ABSTRACT: The crystal and molecular structure of $Pr(TTA)_4 \cdot Py$ have been deter-
mined from the reflection intensities of 4218 independent data. The crystals
are monoclinic with a = 18.363Å, b = 22.150Å, c = 10.910Å, β = 107.38°, Z = 4
and belong to the space group $P2_1/a$. The crystal structure is determined by the
Patterson and Fourier synthesis. Block-matrix least-square refinements lead to
the final reliability factor R = 0.088. The molecular formula and weight are
$Pr(C_8O_2F_3H_4S)_4 \cdot PyH$ and M = 1105.78, respectively.

The praseodymium atom is coordinated with eight oxygen atoms from the four TTA
groups to form a coordination polyhedron of distorted square antiprism. The
average distance between the praseodymium atom and the oxygen atoms is 2.45Å.
The distance of the praseodymium atom to the nitrogen atom of pyridine is 4.43Å.
The particular distance of the nitrogen atom of the pyridine to the oxygen atom
from one of the TTA groups is 2.98Å which presents a hydrogen bond.

CSO: 4009/100

83

Chemistry

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ORG: Department of Chemistry, University of Yunnan, Kunming; Institut
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             13, rue Pierre et Marie Curie, 75005 Paris, France; and Labora-
             toire de Chimie de l'E.N.S.J.F. 1, rue Maurice Arnoux, 92120
             Montrouge, France, respectively

TITLE: "Theoretical Study of the Structure and Formation of the Sulphur
             and Silicon Molecules $HSSi^+$ and $HSiS^+$

ABSTRACT: The equilibrium geometries and rotation constants of the ion $HSSi^+$
and $HSiS^+$ have been determined by an ab initio (SCF + CI) calculations with a
Gaussian extended basis set of double zeta type plus polarization: $d(H-S)$ =
2.63a.u., $d(S-Si)$ = 3.93a.u., $\angle HSSi$ = 92° for $HSSi^+$; $d(H-Si)$ = 2.79a.u.,
$d(Si-S)$ = 3.56a.u., $\angle HSiS$ = 180° for $HSiS^+$. The predicted values for (J = 5←4)
rotational transition frequencies are 85.0 GHz for $HSSi^+$ and 75.0 GHz with two
satellites at 74.0 and 76.0 GHz for $HSSi^+$. The energy difference between the
stable isomer $HSSi^+$ and the metastable isomer $HSiS^+$ is 15 kcal/mol. Both com-
pounds $HSSi^+$ (μ = 2.823^D) and $HSiS^+$ = (μ = 4.833^D) have large dipole moments
and favourable formation energies.

CSO: 4009/103

Chemistry

AUTHOR: ZHONG Guangtao [6988 1639 3447]

ORG: Department of Chemistry, Zhongshan University

TITLE: "Theory of the Substoichiometric Separation--The Equation of State
            of the Substoichiometric Separation"

ABSTRACT: The present paper proposes an equation of state of the substoichio-
metric separation which accurately represents the relationship between the
reaction fraction of reagent and the concentration of elements to be separated.
The conditions of the substoichiometric separation were calculated by this
equation. The results show that the substoichiometric separation theory sug-
gested by Ruzicka and Suzuki cannot exactly express the principle of the sub-
stoichiometric separation.

CSO: 4009/103

Chemistry

AUTHORS: JU Guangzhi [1446 0385 0037]
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              K.T. Lee

ORG: Ju of the Laboratory of Theoretical Chemistry, Shandong University,
              Bowman and Lee of the Department of Chemistry, I.I.T. Chicago

TITLE: "The Correction to Transition State Theory Using Collinear Exact
              Quantum Reactive Probabilities—An Approximate Method of Calculating
              Three Dimensional Quantum Reactive Cross Section"

ABSTRACT: Combining Transition State Theory (TST) with collinear exact quantum
reactive probabilities, a new expression of a reaction rate constant and a new
expression of an average reactive cross section were derived. Using these
formulae, the rate constants and average cross sections for $H + H_2$ (v=0),
$H + H_2$ (v=1), and $D + H_2$ (v=0) reactions were calculated. Comparing our results
with experimental data and the results obtained by 3-D exact quantum calcula-
tions, it is very clear that our method is successful.

CSO: 4009/103

AUTHOR: SUN Yao [1327 1031]
          DING Yingru [0002 3853 1172]

ORG: Both of the Department of Chemistry, Nanjing University

TITLE: "On the Interaction Between Active Component and Support of Iron Oxide/TiO$_2$ Catalyst"

TEXT OF ENGLISH ABSTRACT: The catalyst containing 3 percent by weight of Fe$_2$O$_3$ supported on TiO$_2$ was prepared by impregnation of TiO$_2$ with a solution of ferric nitrate, and subsequently dried at 373°K and calcined at 823°K for 5 hours. Catalyst samples at various steps in the water-gas shift reaction have been investigated by MB, BET and XRD. The MB spectra of the catalyst before reaction indicated that a surface compound which was similar to Fe$_2$TiO$_5$ might be formed on the surface of TiO$_2$ as a result of the interaction between the active component and the support material. Part of this surface compound was finally reduced to FeTiO$_3$ crystal via some intermediate states under the reaction conditions, and this was confirmed by X-ray diffraction investigation.

The activities of the catalysts supported on MgO, γ-Al$_2$O$_3$ and TiO$_2$ for the water-gas shift reaction were determined. On the basis of the catalyst activities, the reoxidation properties of the reduced catalysts and previous conclusions, the extent of the interaction between the active component and support for these three catalysts was compared. The extent of the interaction depended not only on the properties of the support and active component, but also on the reaction conditions. Because of the formation of FeTiO$_3$ crystal, the interaction between TiO$_2$ support and the active component was thought to be stronger than that supported on γ-Al$_2$O$_3$ or MgO. On the other hand, according to the dispersion of iron ions and the extent of reoxidation of iron (II) ions to iron (III) ions, it is found that the order of the interaction between iron (II) ions and the support is as follows: MgO > γ-Al$_2$O$_3$ > TiO$_2$. The relationship between the structure, the texture of the surface compounds and the activities of the catalysts was discussed.

AUTHOR: CHEN Yixuan [7115 1837 5503]
          LIU Huijing [0491 5610 5464]
          CAI Hailin [5591 3189 3651]
          et al.

ORG: All of Dalian Institute of Chemical Physics, Chinese Academy of
Sciences

TITLE: "Microscopic Structure of Metal-Semiconductor Pt/TiO$_2$ Catalyst
Surface"

TEXT OF ENGLISH ABSTRACT: In an attempt to get more evidence of the structural
interaction of Pt and TiO$_2$, morphology of Pt/TiO$_2$ surface was studied using
the transmission electron microscope (TEM) technique. Originally Pt was
photodeposited on TiO$_2$ powder as irregular 20-40 Å microparticles were highly
dispersed on the surface. Upon heating the Pt/TiO$_2$ catalyst at 600-700°C in
an H$_2$ atmosphere, the highly dispersed Pt was found to be transformed into
polygonal particles. The emergence of the "butterfly" pattern in the dark
field TEM picture demonstrated further that the polygonal Pt particles
actually possessed epitaxial multiplane structures.

The pictures of a Pt/TiO$_2$ sample treated in H$_2$ stepwise at 200, 400, 600 and
850°C showed clearly that the micro Pt particles migrated, aggregated and then
turned into the crystalline form progressively. Contrasting this with the
results obtained in a N$_2$ atomsphere, it was ascertained that the treatment
in H$_2$ at elevated temperatures is a paramount condition for inducing
structural changes. The appearance of n-TiO$_2$ defect in the vicinity of the Pt
and TiO$_2$ contacting point was believed to be the direct cause of epitaxial
growth of Pt microparticles.

A possible explanation was given for the observed morphological phenomena
by the postulation of Metal-Semiconductor Interaction for the Pt/TiO$_2$ system.

AUTHOR: LIN Huaxin [2651 0553 2450]
CHEN Yanxin [7115 3601 7451]
DONG Yonglai [5516 3057 0171]
et al.

ORG: All of Dalian Institute of Chemical Physics, Chinese Academy of Sciences

TEXT OF ENGLISH ABSTRACT: The surface properties of Pt/TiO$_2$ were found to be alterable effectively upon high temperature hydrogen treatment, thus the catalytic activity of Pt/TiO$_2$ for the liquid phase photoreaction of CO and H$_2$O could be obviously improved.

The influence of the change of surface properties of Pt/TiO$_2$ on the electron transfer process across the solid-liquid interface has been studied by the dynamic potential sweeping method. As a result of high temperature hydrogen treatment, the SMScI (strong metal-semiconductor interaction) between Pt and TiO$_2$ took place. For the strongly interacted sample, the electronic contact between Pt and TiO$_2$ was gradually changed from "Schottky" to "Ohmic" in nature, and the surface property of Pt/TiO$_2$ was altered. Therefore, additional new surface states were produced, the energy barrier at Pt/TiO$_2$ interface was diminished, and more effective tunnels were developed, thereby speeding up the electron transfer process across the solid-liquid interface and improving the photocatalytic activity of Pt/TiO$_2$ for the liquid phase reaction of CO and H$_2$O. The change of the surface property of Pt/TiO$_2$ could bring about the direct charge transfer between CO and Pt/TiO$_2$ photoelectrodes.

AUTHOR: CHEN Yanxiang [7115 1693 4382]
         ZHONG Chengde [6945 2110 1795]
         ZHENG Jiazhuo [6774 1367 0213]
         et al.

ORG: All of the Research Institute of Lanzhou Chemical Industry Corporation

TEXT OF ENGLISH ABSTRACT: The kinetics of the oxidative dehydrogenation of 2-butene to butadiene over a ferrite catalyst were investigated by the use of continuous flow recirculation method. The experiments have been carried out at temperatures of 300, 320, 340, 360, 380, 400 and 420°C and under total pressure of ~0.830 atm, in which the partial pressures of 2-butene, oxygen and nitrogen are $2.0 \times 10^{-3} \sim 2.5 \times 10^{-2}$, $5.0 \times 10^{-3} \sim 4.0 \times 10^{-2}$ and $9.5 \times 10^{-2} \sim 1.0 \times 10^{-1}$ atm respectively, while the pressure of water is 0.69 atm. Several exponential rate expressions were obtained by using a non-linear, least-squares, computer curve-fitting technique. The rate of formation of butadiene follows half-order kinetics only with respect to 2-butene. The rate of formation of carbon dioxide, however, follows zero-order kinetics with respect to 2-butene and oxygen. It is noted that there are two kinds of active sites on the surface of the catalyst, one of the for the oxidative dehydrogenation of 2-butene to butadiene and the other for the combustion reaction. Furthermore, there is a compensation effect in this catalytic system.

AUTHOR: CAI Shimian [5591 0013 4875]
          XIAO Shijing [5135 1102 6975]
          LIU Huanqin [0491 3562 0530]

ORG: All of the Institute of Chemistry, Chinese Academy of Sciences

TITLE: "An Investigation of the Neodymium Compounds as Catalyst for Propylene Polymerization"

TEXT OF ENGLISH ABSTRACT: The supported catalysts $NdCl_3 \cdot L/MgCl_2$ ($L = [CH_3 - \overset{O}{\overset{\|}{P}} - (- O - \overset{H}{\underset{CH_3}{\overset{|}{C}}} - C_6H_{13})_2]_4$) are prepared by grinding the soluble $NdCl_3 \cdot L$ with $MgCl_2$ in a ball mill for 24 hours. Propylene polymerization can be brought about with these catalysts, and the catalytic activity is 1077 gpp/gNd at 60°C and 9 atms.

The supported catalysts $NdCl_3 \cdot L/MgCl_2/AlCl_3$ are prepared by co-grinding $NdCl_3 \cdot L/MgCl_2$ with $AlCl_3$ for 24 hours. Their catalytic activities are higher than those of $NdCl_3 \cdot L/MgCl_2$, but the isotacticity of the product polypropylene is low. For example, the total isotacticity is only 34.2 percent as the Al/Nd of the catalyst is increased to 200.

Polymerization temperature shows a distinct effect on the activity of the catalyst, with the catalytic activity increasing with the increasing of temperature from 50 to 60°C while decreasing at a temperature of above 60°C. When the temperature exceeds 60°C, the influence of temperature on the isotacticity of polypropylene is not obvious.

The variations of infrared spectra of the ground catalysts of $NdCl_3 \cdot L$ with $MgCl_2$ are also observed.

AUTHOR: WANG Ming [3769 2494]
          YU Shouming [0205 1108 2494]
          HUANG Minming [7806 2404 2494]
          et al.

ORG: All of the Department of Modern Chemistry, University of Science and Technology of China, Hefei

TITLE: "A Sulfur-Resistant Supported Compound Oxide Catalyst for CO Oxidation"

TEXT OF ENGLISH ABSTRACT: An alumina supported catalyst KHW-31# of compound oxide for oxidation of CO prepared by impregnation possesses noticeable sulfur-resistant properties.

At 400°C, the original conversion of CO is 100 percent over 0.2 g of 40-60 mesh catalyst with a reactant gas mixture containing CO 0.49 percent, O_2 3-5 percent, N_2 94.51-96.51 percent and a total gas flow rate of 4500 ml/hr. When 50 ppm SO_2 is added to the gas mixture, the conversion of CO decreases and then tends to be stable after 12 hours, with the stable activity (conversion of CO) being about 80 percent. The conversion of CO decreases no more even over 100 hours. It is found that the stable activity increases with the increase in reaction temperature and the decrease in the content of SO_2 in reaction gas.

When the content of SO_2 in reaction gas is reduced successively to zero, the conversion of CO not only increases gradually, but also can be restored to 96 percent. This shows that the adsorption of SO_2 on the catalyst surface is a reversible adsorption.

9717
CSO: 4009/161

AUTHOR: SHIH Yenyang [2457 7159 2543

ORG: Institute of Electronics, Academia Sinica

TITLE: "A General Purpose CAD Program for Microwave Linear Circuits"

ABSTRACT: In this paper, a general purpose computer-aided design program for
microwave linear circuits is presented. This program provides the capability
of performing frequency-domain analysis, optimization, sensitivity analysis, and
Monte-Carlo analysis for passive or active circuits with complex topology,
including lumped and/or distributed elements. The paper is divided into four
sections, which are: 1) a mathematical description of the methodology used in
the program; 2) a flow diagram showing the logical structure of the program;
3) a summary of the types of microwave circuits that can be analyzed by the
program; 4) numerical examples of analysis and optimization results for selected
circuits of different topology. The numerical results obtained from this pro-
gram (named MICAD) are shown to be consistent with those obtained from the
program COMPACT.

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Publishing House, 1980

3012
CSO: 4009/169

Computer Development and Applications

AUTHOR: CHEN Kaiyong [7115 7030 1661]
          YAO Fusheng [1202 4395 3932]

ORG:

TITLE: "Security Analysis for an East China Power Network"

ABSTRACT: This paper describes a developed software of security analysis for a
power network which is an application program involving modules of topology
determination, state estimation and steady-state security analysis.

The test run of this software indicated a way for on-line application of a type
of Chinese-made minicomputers (DJS-131 and TQ-16) to power network from security
monitoring towards real-time security analysis.

CSO: 4009/1008

Computer Development and Applications

AUTHOR: WANG Rutang [3769 1172 1016]

TITLE: "Software Realization for a Minicomputer Peripheral Device a Chinese
Character Printer"

ABSTRACT: Experiences using the software (RTOS-TD) developed for the Chinese-
made DJS-130 minicomputer to be used with a Toshiba's model CYD-901 needle type
Chinese character printer, are summarized. The modification and supplement made
on the real-time operating system of the minicomputer are described. Practical
application to a power network showed that the system is easy to manipulate
and reliable in operation.

Electronics

AUTHORS: YAN Yonghong [7346 3057 4767]
           HE Yuliang [0149 1342 0081]
           WU Rulin [0702 3067 7792]

ORG: Nanjing University, Institute of Solid Physics

TITLE: "The Effect of Crystallization on Conductance of GD a-Si:H Films"

ABSTRACT: Proper regulation of technological parameters, Ts and rf deposition power, can result in a mode transformation from amorphous morphology into microcrystalline or polysilicon-like structure. The crystallization of amorphous silicon film leads to a further reduction in its room-temperature resistivity by about three order of magnitude and a reduction in its activation energy of electrical conductivity. The enhancement of conducting performance is a consequence of the narrow band tail width in crystallized microcrystalline silicon.

CSO: 4009/134

AUTHOR: ZHANG Zaixuan [1728 0961 1357]
          WANG Jingyun [3769 2529 0061]
          YUAN Yiqian [5913 2022 6197]
          et al.

ORG: All of the Institute of Atomic and Molecular Physics, Physics
Department, Jilin University

TITLE: "Double-Wavelength Pulsed Tunable Dye Laser"

TEXT OF ENGLISH ABSTRACT: Simultaneous tunable two-wavelength operation of
the tunable dye laser pumped by SHG of a Nd:YAG pulsed repetitive Q-switched
laser is described.   R6G, R6G+R640 and R6G+LD473 mixtures in methanol
solution were studied.   The proper choice of the beam splitter and the
Brewster prism pre-expander grazing-incident grating cavity provided a wide
tunable spectral range and low background ASE; the polarized peak output
power of the laser is about 40 kW and the spectral bandwidth is 0.22 cm^{-1}.

AUTHOR: LOU Qihong [2869 4388 3163]
         HE Qisheng [0149 7784 3932]

ORG: LOU of the Shanghai Institute of Optics and Fine Mechanics, Chinese
Academy of Sciences; HE of Huazhong University of Science and Technology

TITLE: "Gain Characteristics of a 10-atm X-ray Preionized Discharge XeCl
Laser"

TEXT OF ENGLISH ABSTRACT: By using the oscillation-amplification technique,
the small signal gain characteristics of an X-ray preionized discharge XeCl
laser at a gas pressure of up to 10 atm have been investigated. The experi-
mental results show that for a Xe:HCl=10:1 mixture with different amounts of
neon dilution, the total gas pressure P_{max} corresponding to the peak small
signal gain appears to increase monotonically with the increasing amount of
neon dilution, but the absolute partial pressure of HCl corresponding to P_{max}
at various mole ratios seems to remain relatively constant.

AUTHOR: ZHANG Lehui [1728 2867 1920/33055]
          LIN Chengtian [2651 2052 1131]
          LIU Hairun [0491 3189 3387]
          et al.

ORG: All of the Institute of Physics, Chinese Academy of Sciences

TEXT OF ENGLISH ABSTRACT: An investigation of the growth and laser properties of gadolinium gallium garnet crystal doped with Nd and Cr is reported. As the segregation coefficient of Nd in GGG is less than 1 and that of Cr is greater than 1, a modified Czochralski method for growth is adopted in order to keep the dopants uniform in the crystal grown.

AUTHOR: ZHOU Yewei [0719 2814 3634]
          ZENG Chuanxiang [2582 0278 4161]
          YANG Shouzhi [2799 1343 2535]
          XIE Jian [6200 0256]

ORG: All of the Department of Physics, Sichuan University

TITLE: "Investigation of Physical Mechanism of Shock Waves in Materials Generated by Q-switched Laser Beam"

TEXT OF ENGLISH ABSTRACT: Using a Q-switched ruby laser pulse to cause a transient heating of silver film on the surface of a piezoelectric ceramic sheet, the investigation of the physical mechanism of the laser-generated shock wave in absorbing materials has been performed. It is shown from the analysis of the electrical signals obtained that there are two types of physical mechanism for laser-generated shock waves: one is the thermal shock which is due to the thermal expansion and the giant stress gradient following the rapid absorption of laser pulse energy at the surface layer of an elastic specimen, and the other is the mechanical shock which is due to the rapidly vaporizing and expanding high temperature vapor which exerts pressure on the target surface.

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CSO: 4009/162

AUTHOR: HE Huijuan [0149 1979 1227]
          LU Guoxian [7120 0948 6343]
          QIAN Linxin [2621 3057 2504]
          et al.

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese
Academy of Sciences

TITLE: "A High Repetition Rate and Mode-locked Phosphate Glass Laser"

TEXT OF ENGLISH ABSTRACT: High repetition rate operation of a picosecond
glass laser up to 10 Hz was achieved by using a new kind of phosphate glass.
The pulse duration is 24 ps, the spectral width is 0.84 Å and the total
energy of pulse train is 6 mJ.

AUTHOR: MA Shusen [7456 2885 2773]
          HU Xuejin [5170 7185 6855]
          YAO Yongbang [1202 3057 6721]
          et al.

ORG: All of Anhui Institute of Optics and Fine Mechanics, Chinese Academy
of Sciences

TITLE: "A Tunable UV Excimer Laser System"

TEXT OF ENGLISH ABSTRACT: A simple tunable UV light pumped by a discharge
laser system has been established. The synchronous operation of the
oscillation and the amplification of two excimer lasers has been performed
by using one spark gap. The tunable XeCl laser system with a single pulse
energy of 11 mJ, spectral bandwidth of 0.07 nm and divergence of 0.2 mrad
has been obtained.

AUTHOR: ZHANG Dake [1728 1129 0668]
          ZHANG Zhengxian [1728 2973 4848]
          FU Shufen [0265 3219 5358]
          et al.

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese
Academy of Sciences

TITLE: "XeCl Excimer Laser Using Liquid as Chlorine Donor"

TEXT OF ENGLISH ABSTRACT: This paper reports the experimental results of a
XeCl laser using CCl_4 or $SiCl_4$ as the chlorine donor and the effect of H_2
on the output performance. The formation kinetics of these systems are
discussed for the first time. The maximum output energy is as much as
80 percent of that using HCl as the chlorine donor.

AUTHOR: HAN Shaoping [7281 4801 1627]
         QIN Yi [4440 3015]
         PAN Chengzhi [3382 2110 1807]
         et al.

ORG: All of Beijing Research Institute of Vacuum Electron Devices

TITLE: "Effects of Pumping Pulse Width in Pulsed Optically Pumped FIR Laser"

TEXT OF ENGLISH ABSTRACT: The effects of pumping pulse width on the energy
output and the conversion efficiency of pulsed optically pumped FIR lasers
have been studied experimentally. It is shown that both the energy output
and the conversion efficiency can be improved notably at 66 μm and 385 μm
lines from D_2O and 496 μm line from CH_3F by means of wide pulse pumping
whether or not they are stimulated Raman emission.

AUTHOR: YAO Guangtao [1202 1639 3447]
          GUI Youxi [2710 1429 0823]
          ZHANG Lanming [1728 5695 2404]
          et al.

ORG: All of North China Photoelectric Research Institute

TITLE: "Growth of a Specially Doped YAG Crystal and Its Multi-function Properties"

TEXT OF ENGLISH ABSTRACT: A YAG crystal which possesses multi-function properties, such as self Q-switching, self mode-locking, self transverse mode-selecting and beam polarizing, has been grown by means of a special doping technique.

9717
CSO: 4009/159

Mathematics

AUTHORS: ZHANG Shanjie [1728 0810 2638]
            JIN Jianming [6855 1696 6900]

ORG: Nanjing University, Department of Physics

TITLE: "The Solution of the Dyadic Green's Functions for Cylindrical
            Cavities by Image Method"

ABSTRACT: The general expression of the dyadic Green's functions for cylin-
drical cavities with arbitrary cross sections is obtained by image method when
the dyadic Green's functions for the corresponding waveguides are known. As
an example, the dyadic Green's function for a rectangular cavity is analyzed,
and the result is identical with that obtained by Ohm-Rayleigh method or by
the scattering superposition method.

CSO: 4009/134

Mechanics

AUTHOR: QIAN Weichang [6929 0251 7022]

ORG: Shanghai University of Technology

TITLE: "Involutory Transformations and Variation Principles With Multivari-
             ables in Thin Plate Bending Problems"

ABSTRACT: The generalized variational principles of plate bending problems are
established from their minimum potential energy principle and minimum complemen-
tary energy principle through the elimination of their constraints by means of
the method of Lagrange multipliers. The involutory transformations are also
introduced in order to reduce the order of differentiations for the variables in
the variation. Furthermore, these involutory transformations become in fact the
additional constraints in the variation, and additional Lagrange multipliers may
be used in order to remove these additional constraints. Thus, various multi-
variable variational principles are obtained for the plate bending problems.
However, it is observed that, not all the constraints of variation can be
removed simply by the ordinary method of linear Lagrange multipliers. In such
cases, the method of high-order Lagrange multipliers are used to remove those
constraints left over by ordinary linear multiplier method. And consequently,
some functionals of more general forms are obtained for the generalized varia-
tional principles of plate bending problems.

AUTHORS: ZHENG Zhaochang [6774 0340 2490]
            TAN Mingyi [6223 2494 0001]

ORG: Tsinghua University, Beijing

TITLE: "Numerical Method in Dynamic Responses of Nonlinear Systems"

ABSTRACT: A kind of modal synthesis technique which is applicable to vibration
analysis for linear substructures with nonlinear coupling attachments is extended
to nonlinear dynamic analysis. A process is suggested that modal synthesis
techniques are further extended to dynamic analysis of large complex structural
systems with nonlinear characteristics of each substructure. Finally, an example
demonstrates the high efficiency of this process.

CSO: 4009/137

Optics

AUTHORS:

QIU Peihua [8002 0160 5478]
CHEN Shuchun [7115 6615 2504]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of
          Sciences

TITLE: "Spectral Study of Infrared Laser-Dyes. II. Experimental Research
          of Picosecond Relaxation Time"

ABSTRACT: The theopetical analysis and the experimental measuring technique of
picosecond relaxation time of the organic dyes have been emphatically discussed.
Based on the properties of the dyes, a simple theoretical model has been proposed
and a fundamental formula has been derived. From this formula, the life-time of
excited state S_1 of the dye molecules is experimentally determined by picosecond
technique.

CSO: 4009/100

Optics

AUTHORS: LI Deyu [2621 1795 1342]
WANG Peiling [3769 0160 3781]

ORG: Shanghai Institute of Ceramics, Chinese Academy of Sciences

TITLE: "A New Method for Estimating the Acousto-optic Figure of Merit of Materials"

ABSTRACT: A method for estimating the figure of merit by the density and chemical formula of a compound was previously suggested by Pinnow. This method is limited in application because the density of the compound concerned must be known. Using the method proposed in this paper, the density and refractive index may be simultaneously evaluated from chemical formula of a compound. Generally, the accuracy of the densities and the refractive indexes is not less than that of the physical parameters given by Pinnow's method. The preliminary estimation of the figure of merit of compounds or systems containing heavy metal oxides will give some helpful suggestions before synthesis and growth of crystals. Also, ALGOL-60 language was used for compiling programs.

CSO: 4009/100

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Optics

AUTHORS: PAN Chengzhi [3382 2110 1807]
             HAN Shaoping [7281 4801 1627]
             LIU Xiuyun [0491 4423 0061]

ORG: Beijing Institute of Vacuum Electronic Devices

TITLE: "Experimental Study of Output Pulse Shapes of a TEA-CO$_2$ Laser"

ABSTRACT: Relationships between the output pulse shapes of a TEA-CO$_2$ laser and
several parameters of the laser have been observed and studied. The front edge,
pulse width and time delay of the laser pulse relative to the start of laser dis-
charge are varied obviously with γ. In order to obtain maximum energy output and
maximum peak power, the laser must be operated in very different conditions.

CSO: 4009/134

AUTHOR: HUANG Hengji [7806 0077 0679]
          Yasunari Zempo

ORG: HUANG of the Department of Physics, Yanbian University; Zempo of
the Department of Materials Science, Hiroshima University, Japan

TITLE: "Scattering of Electrons by Screw Dislocations in Silicon Crystals"

TEXT OF ENGLISH ABSTRACT: In this paper, the scattering of electrons by
<110>-screw dislocations in silicon crystals is discussed. We use the tight-
binding approximation, with only electrons in the s and p state being taken
into account. With the long wave length approximation, only scattering of
electrons near in the first BZ is considered. A scattering theoretical
approach yields an integral equation of the Kirchhoff-Huygens type. The
scattering equation has been solved by means of gauge transformation and
Green's function. It is confirmed that in the case of single bands as
well as that of many bands the shadow, which is the region that cannot be
affected by electron flux, appears in the downstream side of the dislocations
as well.

AUTHOR: ZHUANG Jiejia [8369 2638 0163]

ORG: Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "An Inverse Cherenkov Focusing Laser Accelerator"

TEXT OF ENGLISH ABSTRACT: The principle of the inverse Cherenkov focusing
laser accelerator is presented. It is readily shown, by studying the dynamics
of the charged particles, that the particles are accelerated steadily and
continuously when the condition of the Cherenkov radiation is satisfied, and
they need no additional focusing systems since the laser field on the focusing
axis is just the accelerating field. Therefore, the intensity of the latter
may be higher than that in the previously proposed inverse Cherenkov laser
accelerator. The limitations of this accelerating mechanism are also
discussed.

AUTHOR: FENG Guoguang [7458 0948 0342]

ORG: Institute of Physics, Chinese Academy of Sciences

TITLE: "A New Method for Obtaining Large-Angle Convergent-Beam Electron Diffraction"

TEXT OF ENGLISH ABSTRACT: The symmetry of CBED patterns provides a powerful means for determining the crystal point groups and space groups. To obtain a useful CBED pattern, the angle of convergence of the electron beam must be large enough, but the diffraction discs must not overlap. A new method for obtaining non-overlapping large-angle CBED is proposed here. The principle of this method is equivalent to that proposed by Tanaka, et al. Instead of shifting the specimen, the electron beam is defocused, thus retaining the eccentric height of the specimen. Hence the area of interest will not be lost when the specimen is tilted. Large-angle CBED patterns generated by a large electron probe (>2 μm) may be distorted, but they are useful.

AUTHOR: LIU Shuqin [0491 3219 3830]
          DONG Taiqian [5516 1132 0051]

ORG: Both of Beijing University

TITLE: "The Microwave-Radio Frequency Wave Multi-Quantum Transition in Optical Pumping Experiment"

TEXT OF ENGLISH ABSTRACT: In the optical pumping experiment for ^{87}Rb gas cell, when the microwave and radio frequency wave are applied simultaneously, the optically detected resonance signals of microwave-radio frequency wave multi-quantum transition are observed.
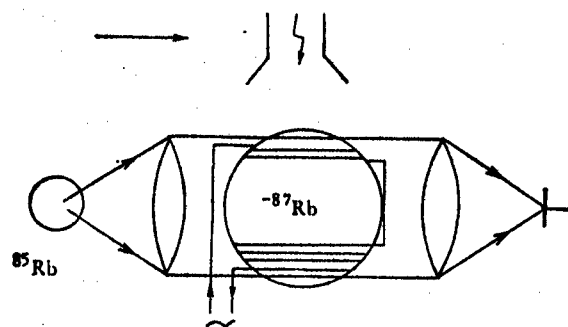
AUTHOR: GAO Zhi [7559 2535]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "On Convective Effects in Gas Lasers"

TEXT OF ENGLISH ABSTRACT: The convection of the gain medium is a decisive
factor for large increase in power output of gas lasers. The present analysis
shows that both the saturation intensity and the laser power density (or the
small-signal gain coefficient) by which the CW laser is characterized increase
nonlinearly with the flow speed and tend toward the respective limiting
values. It is also shown that the increment of the saturation intensity
does not go beyond about 10 times, and a large increase in power density
is caused by the accumulation of excited energy in the flowing gas. These
results are not the same as those of the currently accepted theory which
predicts that the saturation intensity increases linearly and unlimitedly
with flow speed, and a large increase in power density is due to a large
increase in the saturation intensity. The present quantitative results
of the variation of the saturation intensity with the gas flow transient
time are consistent with the experimental data of the flowing CO_2 gas lasers,
where the gas flow transient time denotes the time required for the flowing
gas to move across the gas gain region or the probing-beam section.

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CSO: 4009/152

AUTHOR: ZHANG Chengfu [1728 2110 4395]
          WANG Shijin [3076 6108 6855]

ORG: ZHANG of the Department of Physics, Beijing University; WANG of the
Institute of Physics, Chinese Academy of Sciences

TITLE: "On the Stability of Drift Wave in the Cylindrical Plasma"

TEXT OF ENGLISH ABSTRACT: In the slab model the so-called universal modes are
absolutely stable. However in the cylindrical plasma, instead of the out-going
boundary condition possessed by the slab model, there is no wave energy out-
going at $r = 0$ and $r = \infty$. This could effectively change the stabilities of
the modes.

Assuming exponential plasma density and current profiles, the integral
eigen-equation of the drift wave has been derived. In the case of slow radial
variation, it can be converted into a second order differential equation. The
equation has been solved numerically. The results show that the unstable modes
to exist. The comparison between the two models (cylindrical and slab) has
been made.

AUTHOR: TIAN Bogang [3944 0130 0474]
         LI Jiaming [2621 1367 2494]

ORG: Both of the Institute of Physics, Chinese Academy of Sciences

TITLE: "Generalized Oscillator Strength Density"

TEXT OF ENGLISH ABSTRACT: The total cross section and differential cross
section of high-enerty electron impact excitation can be calculated with the Born
approximation. The differential cross section is proportional to the so-called
generalized oscillator strength. The target atom or ion may be excited to
infinite bound states, auto-ionizing states and adjoint continuum states which
can be treated in a unified manner by the Multichannel Quantum Defect Theory.
Thus, we can define the generalized oscillator strength density as the strength
per unit excitation energy. Taking the lithium atom as an example, we present
here a summary of the variations of the generalized oscillator strength density
with respect to excitation energy as well as momentum transfer. Compared with
recent accurate experimental data, the validity of the Born approximation is
discussed.

AUTHOR: CHANG Tieqiang [1603 6993 1730]
NIE Jingzhong [5119 2529 1813]

ORG: Both of P.O. Box 8009, Beijing

TITLE: "Influence of Collective Effects of Plasma on the Inverse Bremsstrahlung Absorption of Laser Light"

TEXT OF ENGLISH ABSTRACT: This article investigates the influence of collective effects of plasma on bremsstrahlung. According to the theoretical results we obtained, the influences on the inverse bremsstrahlung absorption of laser light and the spectrum and total energy of spontaneous bremsstrahlung are studied numerically.

AUTHOR: XU Zhizhan [1776 5267 1455]
          YU Wei [0151 3837]
          ZHANG Wenqi [1728 2429 3823]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese
Academy of Sciences

TITLE: "Self-consistent Density Profile in Laser-irradiated Plasma"

TEXT OF ENGLISH ABSTRACT: Our calculation indicates that even though various
parameters can be derived without introducing the approximation of local
linearization of the density profile, they characterize the plasma density
profile more completely and accurately.   Therefore, our results may describe
the modification of the density profile by the pondermative force near
critical density more realistically.

9717
CSO: 4009/150

AUTHOR: GUO Guangcan [6753 0342 3503]

ORG: Department of Physics, University of Science and Technology of
China, Hefei

TITLE: "Full Quantum Theory of Optically Pumped Three-Level Laser"

TEXT OF ENGLISH ABSTRACT: The Langevin quantum theory has been used to treat
the optically pumped three-level laser system. We derive an equation of
motion for the laser field in the type of Van der Pol equation when the
photon number of the laser field is not too high. It includes not only
both incoherent and coherent pumping, but also both strong and weak optical
pumping. If an average over reservoir is taken, the equation will give all
the semi-classical results. Our results show that the laser gain comes from
two basic processes, i.e., a two-photon process and a two-step process.
When the pumping strength is larger than a certain value, the dynamic Stark
effect will appear. The laser linewidth is mainly contributed by the thermal
noise, the vacuum fluctuation, the spontaneous emissions between the laser
levels and the spontaneous Raman scattering.

AUTHOR: YE Chaohui [0673 2600 6540]
          QIU Jianqing [5941 7003 0615]
          LI Liyun [2621 7787 0061]
          SUN Boqin [1327 0130 0530]

ORG: All of Wuhan Institute of Physics, Chinese Academy of Sciences

TITLE: "Accurate and Quick Setting of Magic Angle"

TEXT OF ENGLISH ABSTRACT: The FID arising from the quadrupole interaction
is broken into a rotational echo train under the slow rotation condition,
and the number of these echoes increases when adjusting the angle between the
rotational axis and the applied magnetic field toward the Magic Angle. Thus,
an accurate and quick setting of the Magic Angle in MAS-NMR experiments can
be easily obtained by this phenomenon. It is theoretically explained by
analyzing the FID of a spin-1 system. The setting accuracy within 0.05° with
a perdeuterated HMB sample is experimentally demonstrated.

AUTHOR: LU Kunquan [7120 0981 2938]
          ZHAO Yaqin [6392 7161 3830]
          CHANG Longcun [1603 7893 1317]

ORG: All of the Institute of Physics, Chinese Academy of Sciences

TITLE: "Harmonic Effect on EXAFS Amplitude"

TEXT OF ENGLISH ABSTRACT: The effect on amplitude of EXAFS from the harmonic
caused by high order diffraction of a crystal monochromator is discussed.
The general expression and calculated results are presented.   It is shown
that the harmonic decreases the amplitude of EXAFS and the amount of decrease
is related to such factors as intensity ratio of harmonic to fundamental,
thickness and absorption coefficient of specimen.   K edge EXAFS spectra with
and without harmonic for different thickness copper foils have been measured
respectively, and the distortion of single shell EXAFS amplitudes have been
extracted.   The measured results are consistent with the calculated ones.
Consequently, a method to correct the harmonic effect on EXAFS amplitude is
proposed.

AUTHOR: HU Boqing [5170 0130 3237]
          LI Yongjin [2621 3057 3160]
          ZHOU Tang [0719 2768]
          ZHANG Daofan [1728 6670 5400]

ORG: All of the Institute of Physics, Chinese Academy of Sciences

TITLE: "Crystal Growth and Optical and Electric Characteristics of
$2KIO_3 \cdot HCl$ Single Crystal"

TEXT OF ENGLISH ABSTRACT: The grown condition in aqueous solution, morphology
and polarity of $2KIO_3 \cdot HCl$ single crystal were studied.   The transmissivity,
the position of the optical indicatrix in the crystal and the indices of
refraction were determined and discussed.   The phenomenon of phase match
SHG of 1.06 μm from YAG laser was observed.   Its pyro- and piezoelectric,
dielectric characteristics and conductivity were determined.   The anisotropy
of the single crystal is of interest.

AUTHOR: CAO Xiaowen [2580 2400 2429]
          ZHANG Yuheng [1728 5940 1854]

ORG: CAO of the Institute of Plasma Physics, Chinese Academy of Sciences,
Hefei; ZHANG of the Department of Physics, University of Science and Tech-
nology of China, Hefei

TITLE: "The Time Effects and Superconductivity in the Process of Phase
Transition in InSb Films Condensed at Low Temperatures"

TEXT OF ENGLISH ABSTRACT: In this work, the time effects and superconduc-
tivity in the process of phase transition in InSb films condensed at low
temperatures are studied. The following important experimental results are
obtained: (a) Between occurrence of the first and the second conductance
jump, the film samples are in the same amorphous metallic state, and have the
same superconducting transition temperature T_c. (b) The relationship between
T_c and the annealing temperature T_a is very similar to that between
conductivity σ and T_a. (c) After the second jump, the conductance decreases,
and during the process of super conducting transition in the certain transi-
tion zone R(T), the samples transform gradually from perfect to partially
superconducting. (d) There are obvious time effects in the process of phase
transition.

9717
CSO: 4009/153

SCIENTIFIC ABSTRACTS

Physics

AUTHOR: CHEN Zhixing [7115 1807 5887]

ORG: Chemistry Department, Zhongshan University, Guangzhou

TITLE: "Perturbation Theory of Reactivity (I)"

ABSTRACT: A simplified perturbation treatment results in a fundamental equation of reactivity. This equation is characterized by giving consideration to bond breaking as well as bond formation, whereas current considerations in literature are only focused on the latter. A simplified HMO model for reactions is proposed to match the equation. Applications of the model and the equation to some simple examples show the effectiveness of the theory and the necessity of giving consideration to bond breaking.

CSO: 4009/103

AUTHOR: BAO Zheng [0202 6927]
          PENG Xueyu [1756 1331 1946]
          ZHANG Shouhong [1728 1343 1347]

ORG: Northwest Telecommunications Institute, Xian, China

TITLE: "A Study of Weather Clutter Rejection of MTD Radar"

SOURCE: Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 12 No 1 Jan 84 pp 28-34

ABSTRACT: This paper studies clutter rejection of the moving target detection (MTD) radar and proposes the average improvement factor as a measure of the performance of a MTD processor. Several kinds of equipment with different structures are compared. Some important points are put forward, to which sufficient attention should be paid when a MTD processor is to be constructed.

CSO: 4009/1007   - END -